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SOCIO-ECONOMIC BASE REPORT

Delmarva River Basins Survey

by

Kenneth S. Krupa

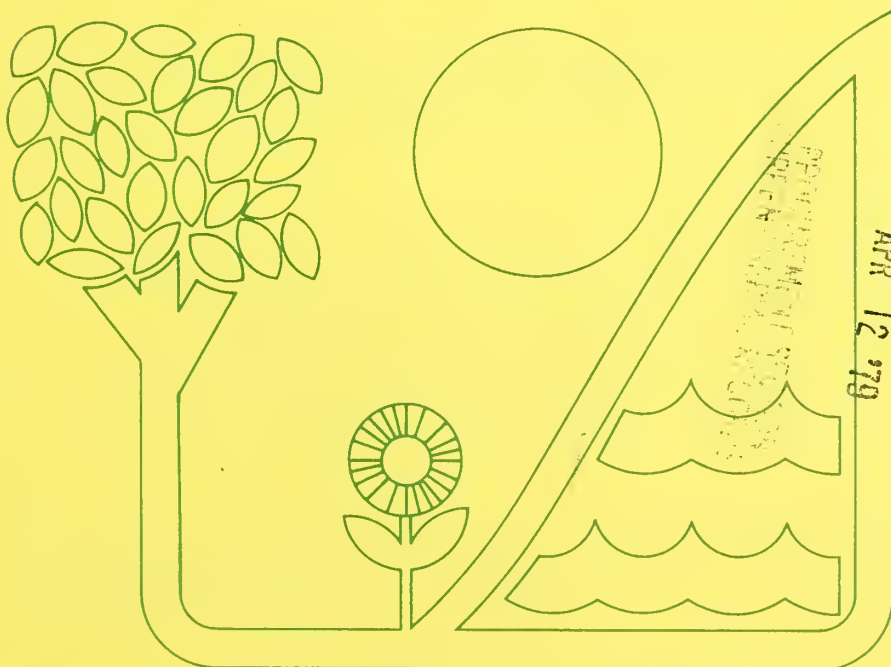
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James E. Horsfield

June 1978

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by
Kenneth S. Krupa
and
James E. Horsfield

June 1978

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Working Materials Published in this Form
for Interagency Use in Planning Efforts
in the Survey Area

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This report is a revision of the 1975 Preliminary Socio-Economic Base Report authored by USDA economists Susan G. Middleton and James E. Horsfield.

FORWARD

The Delmarva River Basins Cooperative Survey involves the participation of Federal and State agencies in a coordinated study of water and related land resource problems on the Delmarva Peninsula. The Economics, Statistics, and Cooperatives Service (ESCS), as a participating agency of the United States Department of Agriculture, has been assigned to conduct economic analyses in support of the objectives of the survey and to collect and tabulate secondary data pertaining to the Peninsula's population, economy, and use of land and water resources. This appendix is intended for distribution to participating Federal and State agencies to provide a common reference for social and economic data collected in the initial and succeeding phases of the survey. Included are a brief history of the Peninsula and descriptions of the Peninsula's population, general economy, agriculture, land use, and water use along with supporting data descriptive of current conditions and recent trends. Additional appendices present the results of detailed analyses of economic conditions on the Peninsula today and of conditions expected to prevail in the future.

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SOCIO-ECONOMIC BASE REPORT:
DELMARVA RIVER BASINS COOPERATIVE SURVEY

by

Kenneth S. Krupa*
James E. Horsfield*

INTRODUCTION

This socio-economic base report contains historical data for the use of participants in the Delmarva River Basins Cooperative Survey. The agencies of the United States Department of Agriculture (USDA) assisting in this survey are the Economics, Statistics, and Cooperatives Service (ESCS), Soil Conservation Service, and the Forest Service. These agencies are participating in the survey at the requests of the states of Delaware, Maryland and Virginia. The purpose of this report is to provide a general overview of the social, political, and economic conditions existing within the survey area and to serve as a basic point of reference for a series of more specialized reports.

The objective of the entire series of reports -- inventorying existing resources, documenting past economic trends, and presenting future projections -- is to provide detailed information to aid policy makers in planning for the orderly development, utilization, management, and conservation of water and related land resources within the survey area. These reports provide a base upon which to formulate a plan of action to promote economic growth, control development, and provide for environmental enhancement in the Peninsula area.

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This particular report contains a history of the socio-economic development of the Peninsula and a summary analysis of the region's population, economy, and agriculture. Additional sections discuss current land and water uses. Principal sources of data for the report were the Census of Population, Census of Agriculture, Census of Manufacturing, state agency reports, and previous studies of the region. Additional data was provided by the Bureau of Economic Analysis, United States Department of Commerce.

Geography and Climate

Figure A is a map of the Delmarva River Basin survey area. Since the northern boundary of this area is located at the Chesapeake and Delaware Canal, portions of Cecil County, Maryland and New Castle County, Delaware, are included in the survey area.^{1/} In addition, the survey area encompasses two counties in Delaware (Kent and Sussex) eight counties in Maryland (Kent, Queen Annes, Talbot, Caroline, Dorchester, Wicomico, Somerset, and Worcester) and two counties in Virginia (Accomack and Northampton).

The Delmarva Peninsula is approximately 174 miles from north to south and at the widest point is 74 miles from east to west. The region, encompassing a 7,500 square mile area, contains approximately 3,565,000 acres of land and 1,282,000 acres of various types of water.

Topographically, the Delmarva Peninsula is relatively flat - especially along the coast and nearshore - with gently rolling hills located in some inland areas. Surface elevations range from zero to 310 feet above sea level. However, the vast majority of land area is less than 80 feet above sea level.

^{1/} Census data in this report includes totals from Cecil County, Maryland, and New Castle County, Delaware. Data provided by the Bureau of Economic Analysis, however, is for the twelve-county area excluding Cecil and New Castle counties.

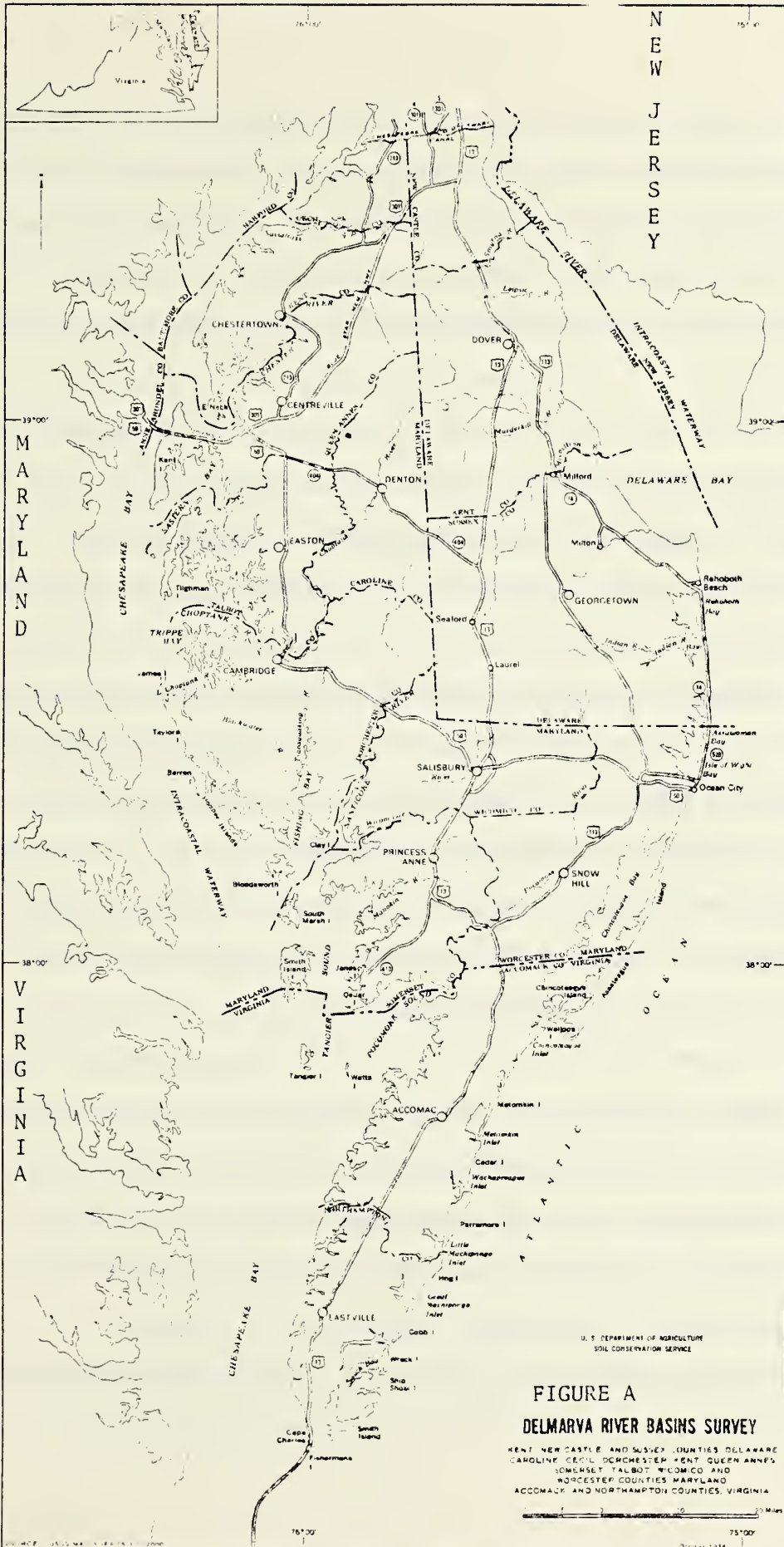


FIGURE A
DELMARVA RIVER BASINS SURVEY

KENT, NEW CASTLE AND SUSSEX COUNTIES, DELAWARE
CAROLINE, CECIL, DORCHESTER, KENT, QUEEN ANNES,
SOMERSET, TALBOT, WILMICO AND
WORCESTER COUNTIES, MARYLAND
ACCOMACK AND NORTHAMPTON COUNTIES, VIRGINIA

From a geological perspective, the area of the Peninsula south of the Chesapeake and Delaware Canal is located entirely within the Coastal Plain. The soil structure of the Coastal Plain contains sedimentary layers of sand, silt, gravel, and clay resting on a base of hard crystalline rock. Surface soils - which span the range from sandy to clayish - tend to be slightly acidic in nature.

The Delmarva Peninsula is located on the mid-Atlantic seaboard of the Eastern United States between 37 and 40 degrees north latitude. The region has a basically temperate climate with four well defined seasons. Weather systems generally approach from the west as in most areas of the continental United States.

The climate is relatively moderate with plenty of sunshine, abundant precipitation, and a long growing season. Proximity to the Chesapeake Bay and the Atlantic Ocean, to a lesser extent, has a modifying influence on the climate. Average yearly temperatures range from 54⁰ to 59⁰ F. January has traditionally been the coldest month with average minimum daily temperatures ranging between 27⁰ and 29⁰. July is usually the warmest month with average maximum daily temperatures between 86⁰ and 88⁰.

In the extreme northern section of the Peninsula the frost free period normally extends from late April to early October. This period between the last 32⁰F temperature in the Spring and the Fall, the growing season, generally averages 181 days. On the southern tip of the Peninsula the frost free dates normally extend from late March through mid-November with the growing season generally averaging 203 days.

Precipitation usually ranges from 40 to 46 inches per year including 10 to 13 inches of snow. However, the atmosphere reclaims through evaporation

from land, water, and plant sources sixty percent (or 26 inches) of the annual precipitation total. The amount and frequency of precipitation have created some agricultural water distribution problems within the Peninsula. Many low lying fields are in need of drainage to improve crop yields. For sandy soil during dry periods irrigation is sometimes necessary to supply moisture to crops at critical stages of development.

General Description

The level to gently rolling coastal plains of the Delmarva Peninsula are deeply incised by streams and tidal estuaries. The Peninsula is almost entirely surrounded by tidewater and the shoreline is irregular with numerous bays and inlets. The three bodies of water surrounding the Peninsula are: the Chesapeake Bay to the west, Delaware Bay to the east, and the Atlantic Ocean to the east-southeast.

Dividing the narrow northern end of the Peninsula is the Chesapeake and Delaware Canal. The eastern portion of the canal is located in the State of Delaware and the western portion lies in the State of Maryland. The canal connects the Chesapeake Bay and the Delaware River and is a demarcation line between the Boston-Washington megalopolis and the rural environment of the Peninsula.

To the north are the cities of Wilmington and Philadelphia while to the south small towns, farmland, and woodland predominate. For generations the mainstreams of industry and commerce have tended to bypass the Delmarva area in favor of such nearby "mainland" centers as Philadelphia, Wilmington, and Baltimore. Consequently, the Delmarva Peninsula has remained an exclusively rural and small town region although the agricultural, industrial,

and seafood products of the area are largely oriented towards nearby urban markets.

Within the Peninsula there is a northern (upper) and southern (lower) area. The land in the lower portion is flatter than that in the upper portion. While both sections are dependent upon farming, fishing, and small to medium scale manufacturing, the lower sector is more highly urbanized, has more truck farming, and does a considerably greater amount of food processing.

The word "Delmarva" is a derivation of names of three states--Delaware, Maryland, and Virginia--that share jurisdiction over the Peninsula. The Delmarva Peninsula is unique in two respects. First, it is the only peninsula in the United States divided among three states. Second, the official state boundaries within the Peninsula are artificial, as opposed to being natural barriers--such as mountains, rivers, or other bodies of water. The reason for the unique political subdivision of the area can only be explained by reviewing the history of the Delmarva Peninsula--frequent site of territorial disputes between sovereign states seeking control over the vast and varied resources of the area.

History

The Algonquian Indians were the first inhabitants of the Chesapeake Bay region. Much of the area still bears the Indian names of Assateague, Sinepuxent, and Chincoteague. Even the name "Chesapeake" is thought to be a derivation of the Indian word K'Che-sipiah meaning country on a great river.

The first documented European contact occurred in 1608 when an expeditionary force under the direction of Captain John Smith explored much of the Chesapeake Bay area. Less than a decade later settlers from the Virginia Colony began populating the southern tip of the Peninsula. While

the English were exploring and settling the southern portion of the Peninsula the Swedes were exploring and establishing settlements in the northern part. The major Swedish enclave was located on the site of the present-day city of Wilmington, Delaware.^{1/}

Other Europeans were eager to explore and colonize the rich new world. Numerous skirmishes and battles were waged for control of land and colonies. The Dutch, anxious to extend their influence from New Amsterdam (New York), fought and defeated the Swedes in Delaware. The Dutch leader, Governor Peter Stuyvesant, renamed the area New Amstel. The Dutch were industrious in their agricultural pursuits; made numerous internal improvements including the digging of canals and the diking of marshes; and developed the settlement of New Amstel into a prosperous marketing center. Dutch influence lasted about nine years. In 1664, King Charles II of England suggested that his brother - James, Duke of York - organize a military expedition to wage war against the Dutch colonies. In 1665 both New Amsterdam and New Amstel were captured, placed under the administrative supervision of the Duke of York, and renamed New York and New Castle.

Sections of Delaware were long regarded as part of Maryland by the House of Calvert - colonial rulers of the Free state. In a bold attempt to strengthen the Calvert claim, the Provincial Council in 1669 directed that two additional counties - with allegiance to Maryland - be created in the Delaware territory. A bitter dispute ensued between the Calverts and James, Duke of York.

In 1672, the controversy was presented before the Privy Council of London

^{1/} Historical facts and dates were derived from Community Economic Inventories, Maryland Department of Economic Development and Economic Data Summary, Division of State Planning and Community Affairs (Accomack and Northampton counties, Virginia).

for adjudication, the matter taken under consideration, and deliberated upon for over thirteen years. During the course of the deliberation, James, Duke of York, ascended the throne of England as King James II. In 1682, King James II ceded the land in controversy, the three counties of Delaware, to William Penn - Founder of Pennsylvania. No doubt influenced by the fact that one of the litigants was the reigning monarch of England, the Council handed down a ruling in 1685 to the effect that the disputed territory belonged to the Crown and not to Maryland.

In 1704, William Penn permitted the three counties of Delaware to form a separate colonial government. Under terms of the agreement, Delaware residents were granted the right to establish entirely free and separate Legislative and Judicial branches of government. However, Executive power was to be retained by Pennsylvania authorities. For over seven decades - until 1776 - the Governor of Pennsylvania remained the chief Executive officer of the colony of Delaware.

Territorial disputes, especially between Penn and Calvert descendants, continued in the area until 1768 when a five year survey of the boundaries by two English mathematicians, Charles Mason and Jeremiah Dixon, was completed. The survey, settling all disputes, established the boundary lines between Maryland, Pennsylvania, and Delaware. Later, during the Civil War, the Mason-Dixon Line was to become the symbolic dividing line between the North and the South.

Toward the latter part of the Eighteenth Century the town of Wilmington became sufficiently populated to warrant the building of a town hall and the chartering of a bank. During this period, the states of Maryland and Delaware approved construction of the Chesapeake and Delaware Canal. Officially opened in 1829, the Canal provided a shipping route from Philadelphia

and Wilmington to Baltimore, Virginia, and the rest of the Chesapeake Bay. While the section north of the Chesapeake and Delaware Canal gradually became part of a large urban complex, the area south of the Canal remained primarily rural and agricultural. Geographically, the rural, agricultural section of the Peninsula was separated by water from the northern, urban section and bypassed when the great westward flow of immigration occurred during the 1800's. For three hundred years the Peninsula was relatively isolated. Access from the mainland and from the large population centers was by ferry or by secondary roads from the North. Construction of the Bay Bridge connecting Annapolis with Queen Anne's County, Maryland, in 1952 (and a parallel span completed in 1972) provided a major east-west link between the Baltimore - Washington urban complex and the Delmarva Peninsula. In 1964 construction was completed on the Chesapeake Bay Bridge - Tunnel, a major north-south artery connecting the Norfolk - Portsmouth metropolitan area with Northampton County, Virginia on the southern tip of the Peninsula. The bridge - tunnel, which transverses the Chesapeake Bay for twenty-one miles, is the longest bridge-tunnel in the world.

Chesapeake Bay^{1/}

Chesapeake Bay is the largest estuary on the Atlantic Coast of the United States and including its tributaries is one of the largest estuarine systems on earth. The bay runs in a north-south direction for two hundred miles and is roughly parallel to the Atlantic Coast. At the southern extreme it is freely connected with the Atlantic Ocean. The width of the bay varies from

^{1/} This section is a summary of the description and the problems of the Chesapeake Bay.

Sources: The Chesapeake Bay Plan of Study (Volume I, pages 7-10, June of 1970) and Chesapeake Bay Future Conditions Report (Volume I, Summary, August of 1977).

four miles wide at Annapolis to thirty miles wide at the mouth of the Potomac River. The depth averages twenty-one feet but there are deep holes which occur as long narrow troughs. These troughs are thought to be remnants of the Ancient Susquehanna River Valley which have not been filled by post-Pleistocene sediments.

Chesapeake Bay is entirely within the Atlantic Coastal Plain. The coastal plain is underlain by a thick, wedge-shaped series of sedimentary formation which strikes northeast and dips gently toward the southeast.

The mean tidal fluctuation of the bay is small, generally between one and two feet. Saline water intrusion is highest along the eastern shore due to the influence of the Atlantic Ocean. Salinities range from 35 parts per thousand inside the mouth of the bay to near zero at the northern end of the bay and at the heads of embayments tributary to the bay. Salinity variations, spatial and temporal, are the most significant physical characteristics influencing the circulation patterns of the estuary.

Average maximum tidal currents range from .05 to over three knots. The tidal currents supply the means for the mixing of ocean and fresh water. Non-tidal circulation in the smaller tributaries of the bay is controlled by the temporary variations of salinity in the bay. Salinity decreases in the bay during winter and early spring. Salinity in the smaller tributaries is greater than in the bay during this period. Because of the significant salinity difference, surface water from the bay flows into the tributaries, while bottom water from the tributaries flows into the bay. As bay salinity becomes greater through summer and early fall, bay waters flow into the bottom of the tributaries, while tributary surface waters flow into the bay.

The physical and chemical dynamics of the estuary make it a biologically unique environment. Salinity variations within the Chesapeake Bay have

allowed colonization by aquatic organisms of both fresh and salt water origins. Fresh water biota remain in the fresh or slightly brackish water portions. Many marine animals return to fresh water to reproduce. With the aid of estuarine currents, the eggs and larval forms of some species are transported to less saline water to hatch or develop.

Chesapeake Bay, because of its great length of shoreline and its extensive shallows, weed beds, and marshes, protects as well as nourishes larval and juvenile animal forms from immediate predation and wave action. The marshes of the bay generate organic debris and animal nutrients, constituting a significant factor in the overall estuarine productivity.

Chesapeake Bay produces large crops of estuarine species. The most important economically are the soft-shelled clam, oysters, blue crabs, menhaden, and alewives. Many of the 238 recorded fish species are permanent residents. Shad and river herring spawn at the headwaters. Striped bass and white perch produce large populations in the nearly fresh water of the upper bay to spread throughout the bay. Many ocean spawners use the bay as a nursery for their young. A wide variety of oceanic species enter the bay as juveniles or adults to feed.

Between 1966 and 1970, an average of 281 million pounds of commercial seafood, valued at more than \$30 million annually, was harvested from the Chesapeake Bay. The average finfish catch - primarily menhaden and alewife - amounted to 243 million pounds worth \$3.7 million. During the same time period the average harvest of shellfish (crabs, oysters, and clams) totaled 88 million pounds (excluding shell weight) worth over \$23 million. Though accounting for over 24 percent of the total seafood harvest, shellfish generated 78 percent of total revenue.

In 1973, the composition of the seafood harvest differed somewhat. The commercial harvest of certain types of finfish - alewife and perch - declined markedly from the 1970 level. However, commercial fishermen netted unexpectedly large numbers of bluefish, sea trout, and croakers. Commercial shellfish harvests in 1973 were of comparable magnitude to harvests of 1966-1970 in terms of both weight and value. Clams, and to a lesser extent crab catches, in both states decreased considerably from previous years due to the disruptive effects of Tropical Storm Agnes.

While the 1973 oyster harvest in Maryland was the largest in 30 years, in Virginia the oyster catch was the lowest on record due to a poor reproduction rate, disease, and adverse weather conditions.^{1/} In 1975, oysters landed commercially at ports on the Eastern Shore of Maryland amounted to 13,401,000 pounds (not including shell weight) worth \$10,780,590. During the same year, 748,100 pounds of oysters valued at \$551,930 were harvested in the waters adjacent to Accomack and Northampton counties, Virginia. It should be noted that the dollar value was that paid at the dock, not the wholesale or retail value at market, and that the figures are only for commercial oysters harvested on the Delmarva side of the Chesapeake Bay. Data for 1976 indicates that 9,047,800 pounds valued at \$9,611,732 and 1,320,400 pounds worth \$985,717 were landed at ports in the same areas of Maryland and Virginia, respectively. Interestingly, Talbot County, accounting for approximately 5 million pounds in 1976, registered the largest oyster harvest of all Peninsula counties during the 1975-1976 period.

A significant quantity of finfish were landed by sport fishermen whose value may equal or exceed that of the commercial operators. In addition, a

^{1/} Chesapeake Bay Future Conditions Report, (Volume I, Summary, August of 1977), pages 90-95.

number of clams, oysters, and crabs were harvested by individuals for recreational or personal uses. These sport fishing, shellfishing, and boating activities contributed significantly to the tidewater way of life cherished by many residents and non-residents alike.

In 1974, waterborne commerce, totaling approximately 160 million short tons, moved over the waterway and contributed, in large measure, to the economy of an eleven-state area extending into the Midwest. The trend in commercial navigation is toward larger ships which in turn require deeper channels, posing greater problems in locating dredge spoil disposal areas. Modifying channel geometry may cause increases in upstream salinity, and indiscriminate disposal of spoil can have marked effects on living marine organisms.

Delaware Bay

Delaware Bay is in the shape of a flattened funnel - narrow at the northwestern terminus but widening to the southeast as the mouth joins the Atlantic Ocean. The bay, which lies between Cape May, New Jersey, to the north and Cape Henlopen, Delaware, to the south, is forty-six statute miles in length and twenty-seven miles at the most extreme width. Total shore line is 128 miles and the average depth is 31 feet with the maximum depth being 151 feet. Delaware Bay is shallow on the eastern (New Jersey) side and although deeper on the western (Delaware) side, a forty foot channel has been dredged to allow for the large ships that ply the bay towards the ports of Philadelphia, Baltimore, Wilmington and Trenton.

There are many similarities between the Delaware and Chesapeake bays. Both are located within the coastal plain; both have varying degrees of salinity that allow for aquatic organisms from both fresh and salt water

origins; both attract ocean spawners to feed and lay their eggs; and both provide an environment for the clam, oyster, blue crab, and menhaden. While Delaware Bay is smaller in area, the level of pollution is relatively greater than in the Chesapeake Bay. The Delaware River, which flows past Trenton, Philadelphia, Camden, and Wilmington deposits substantial amounts of partially treated sewage and industrial waste into Delaware Bay. Pollution concentrations within the bay have reduced recreational opportunities with many areas being closed to shellfishing and swimming.

An assessment of the situation between 1973 and 1978 indicates that the level of pollution did not change appreciably - remaining the same or experiencing a very modest improvement - from previous periods. Under the direction of the Federal Environmental Protection Agency progress was made in curing industrial pollution - especially in the Philadelphia area - during the five year period. Due to the large population and massive concentration of industrial concerns along the Delaware River, returning the water to a relatively pure form is a formidable task. However, it is expected that steady progress will be made in returning the Delaware River to a much improved state over the next several decades.

Commercial fishing, once a major enterprise on the bay, has declined because of disease, pollution, and economics. The oyster industry is an illustration of this decline - once a rich and abundant harvest, most oysters were harvested from natural beds. In the twelve year period from 1946 to 1957, only 686,000 bushels of oysters were planted but over 2,961,000 bushels were harvested. In 1950 most of the young oysters were killed by a disease called MSX and by 1960 the natural beds were barren.

The annual number of oysters harvested from Delaware Bay since 1950 has

varied considerably. In 1953 - a year of recovery - the oyster catch was valued at \$2,750,000. In 1963, a year of appreciable decline, the value of the harvest was only \$30,000. In 1975, 195,000 pounds (excluding shell weight) of oysters valued at \$226,750 were landed at Delaware ports. It should be noted that monetary value in 1975 and 1976 was that paid to oystermen directly, not the wholesale or retail price and that the poundage included only oysters harvested by commercial oystermen in New Castle, Kent, and Sussex counties - not including the New Jersey shore of the Delaware Bay. In 1976, 262,300 pounds of oysters with a value of \$380,700 were harvested by Delaware oystermen.

The aesthetic quality of the bay has declined but it remains a major waterway. During 1972 approximately 64 million tons of international waterborne commerce traveled the bay destined for the ports of Philadelphia, Baltimore, Wilmington, and Trenton.

Transportation

The major transportation system within the Delmarva Peninsula is U.S. Highway 301. This is a dual highway and a north-south through route extending from the New Jersey turnpike across the Chesapeake Bay Bridge and thence southward to Florida. The Chesapeake Bay Bridge connects the Eastern and Western Shores of Maryland on Routes 50 and 301, forming an important link in the Peninsula's transportation system. Another dual highway, Highway 50, serves as the principal Maryland gateway to the Peninsula in addition to being an important connector between the Peninsula and Washington, D.C. and major interstate highways to the west and south.

Highway U. S. 13 is the major north-south divided highway that offers a rapid route from Wilmington south to the Bay Bridge-Tunnel. Since the

construction of the Bay Bridge-Tunnel the peninsula serves as a transportation corridor between Wilmington, Norfolk and points south and west. Several trucking lines serve the area and provide twenty-four hour service within a three hundred mile radius that encompasses the Boston to Washington, D.C. megalopolis.

In April of 1976 Conrail (Consolidated Rail Corporation) was created as part of a national reorganization of the railroad system in the Northeastern United States. Conrail, under the auspices of the Federal Government, acquired several sections of former Penn Central Railroad track and in 1978 operated two main freight, but no passenger, lines on the Delmarva Peninsula. One line provides north-south service from Wilmington through Salisbury, where there are several industrial spur lines, to the vicinity of Pocomoke City in southwestern Worcester County. The other major trunk line extends east from Harrington, in southwestern Kent County (Delaware) then south to Snow Hill in central Worcester County, Maryland.

Conrail freight trains operate once a day, five days a week, between Dover and Pocomoke City. Rail service between Harrington and Snow Hill is two to three times per week. The frequency of industrial spur service is largely determined on the basis of need. In mid-1978 Conrail was in the process of investing modest amounts of capital on the Peninsula to maintain the road bed and increase rail efficiency.

Several sections of the former Penn Central Railroad, not acquired by Conrail, were leased to private enterprises, or a combination of state, local, and private concerns, and provide additional rail service on the Peninsula. The Virginia and Maryland Railroad supplements the basic Conrail north - south freight route by continuing service from the vicinity of Pocomoke City through Accomack and Northampton Counties for approximately

sixty miles to the southern tip of the Peninsula. The Maryland and Delaware Railroad provides east - west freight service five times per week between Seaford, in west-central Sussex County, and Cambridge, in northwestern Dorchester County, and three times weekly between the community of Clayton, located in north-central Kent County (Delaware), and the central Talbot County city of Easton.

In mid-1978 both railroad companies were participating in the Federal Light Density Line program. Under the provisions of the program, Federal assistance of 80 percent, supplemented by either 20 percent State or private funds, was made available to rehabilitate relatively unsafe and inefficient rail beds. The purpose of the program was to insure that deteriorated rail stock was upgraded to comply with the Federal ten mile per hour minimum speed and safety standard.

National and international air passenger and freight service is available in major metropolitan areas adjacent to the Peninsula at airports in Norfolk, Baltimore, and Wilmington. On the Peninsula, airports at Dover and Salisbury provide area residents and businesses with regional and commuter air service within the Northeastern corridor while numerous small airstrips provide charter service and private aviation facilities. The major bus companies such as Trailways and Greyhound serve the region with terminals located in the larger population centers.

The Peninsula is surrounded by several major waterways: the Delaware River, the Chesapeake and Delaware Canal, Chesapeake Bay and Atlantic Ocean. The C&D Canal is a transportation link between Philadelphia and Baltimore. The canal is used by large ocean going vessels because it shortens the route

from Baltimore to Philadelphia by 316 miles, to New York by 179 miles, and to European ports by about 100 miles.^{1/}

Commerce through the C&D Canal is dominated by domestic movements of bulk oil and foreign movements of general cargo which together accounted for approximately 70 percent of total traffic in 1972. In addition to bulk oil and general cargo, there are significantly smaller quantities of coal, ore, grain, and miscellaneous bulk commodities passing through the C&D Canal. During the 1965-1972 period an average of about 1.1 million short tons of cargo was transported through the canal annually. The potential exists for a substantial increase in tonnage if a significant number of Northeastern power plants convert from oil to coal. In 1977, the depth of the C&D Canal was increased from 27 to 35 feet.

Although the port of Baltimore is not located on the Peninsula, it performs a major import-export function for the region. In 1972, approximately 58 percent of the vessels engaged in foreign traffic destined for or leaving the port of Baltimore traveled through the C&D Canal. Located fifty to two hundred miles further inland than other Atlantic ports, Baltimore serves the Midwest markets more economically. In terms of trade, the port of Baltimore exports large quantities of coal and grain while importing considerable amounts of iron ore and petroleum. The port of Baltimore is second to New York City in container cargo handled and is ranked fourth in the United States in volume of foreign trade handled.

The only deep water port that is located on the Peninsula is Cambridge, Maryland. The municipal channel to Cambridge is twenty-five feet deep. Cambridge is considered a general cargo deep water port capable of handling moderate sized vessels. Several other inland communities on the Peninsula

^{1/} Chesapeake Bay, Existing Conditions Report - Appendix A, Department of the Army, Baltimore District, Corps of Engineers, p. A-II-8 (1973).

have port facilities served by shallower channels. In 1972, the Wicomico River, with a 14 foot deep channel leading to Salisbury, and the Nanticoke River, dredged 12 feet deep to Seaford, handled inland barge movements of approximately .7 million and .5 million short tons of bulk oil, respectively. Both the Tred Avon River, with a 12 foot deep channel to Easton, and the Choptank River, dredged to a depth of 8 feet to Denton, received moderate amounts of inbound barge traffic bearing oil, fertilizer, and slag for construction purposes.^{1/}

Water and Related Land Resources

Population growth and economic development are significant factors on both the supply and demand sides of the use of water and related land resources, as the availability and abundance of these resources may stimulate growth. For example, the Delmarva Peninsula's proximity to the Chesapeake Bay and the Atlantic Ocean makes the area ideal for recreation. Growth in this industry may be stimulated by the fact that open land is available upon which second (vacation) homes or recreation sites may be built.

Additional development on the Peninsula would mean an increase in employment, incomes, and in the well being of area residents. However, subsequent growth would place many demands upon the natural resource base. Population growth, increasing incomes, and expansion of industrial output demand electric power, transportation services, and recreational opportunities. These products and services are dependent upon water, land use, and development.

The interrelationship between the use of water and land is complex. Development of land for agricultural, commercial, or residential use may require engineering measures to lower the water table for drainage or flood protection purposes and concurrent water resource development to provide adequate

^{1/} Chesapeake Bay Future Conditions Report, (Volume 1, Summary, August of 1977), pages 67-74.

water supplies for municipal purposes or for irrigation. Additionally, the quantity and quality of water is influenced by the use of land in that urban and industrial growth are frequently the causes of flooding, water pollution, and sedimentation.^{1/} The increasing demand for land, which affects water use in turn, is expressed succinctly by Marion Clawson: "...as total population grows, more land will be required for site purpose... for primary homes, for second homes, for shopping centers, for offices, etc. As incomes rise and as leisure increases, more land will be used for recreation either as the sole use or as one of several uses. More people will require more food... and higher outputs per acre may meet most or all of the increased volume of food commodities required by more people."^{2/}

The use of water and related land resources is linked with population, income, and employment growth. Increasing numbers of persons with higher incomes and more jobs will cause more intensive use of water and related land. Consequently, growth will affect the future availability and cost of these finite resources. Effective resource management and planning for the area should provide for regional growth and prosperity while maintaining and protecting the unique environment that exists on the Delmarva Peninsula.

^{1/} Don Maughan, Water Resources Planning (New York, 1971), p. 88.

^{2/} Marion Clawson, National Land Use Policy (New York, 1971), p. 31.

POPULATION CHARACTERISTICS

This section presents general parameters of population and income supplemented by indicators of the age distribution of the population, educational levels achieved, the composition of the labor force, unemployment, population density, income distribution and poverty, and housing conditions.

As shown in Table 1, the number of persons residing on the Peninsula in 1970 - the date of the most recent official census survey - was 849,868. This total represented an increase of 270,028 (or 46.6%) over the 1950 population. The national population grew approximately thirty-three percent over the same twenty year period, considerably less than the Peninsula growth.

According to the Bureau of Census population estimates and projections, the number of persons residing within the confines of the Delmarva Peninsula in 1976 was 907,200. During the six year period between 1970 and 1976 the population was estimated to have increased by 57,332 or 6.7 percent. Over the twenty-six year period between 1950 and 1976 the Peninsula experienced an increase of 327,360 (or 56.5%) in population.

Table 1 also presents data on the rural population of the Peninsula and its farm and non-farm components. The growth of the Peninsula population and of the rural and rural non-farm population is also illustrated in Figure B. In 1970, 47.1 percent of the Peninsula population was classified as "rural" and 3.7 percent was "rural farm." In 1950, these statistics were 57.3 percent and 17.0 percent respectively.

The Peninsula totals shown, however, are not truly representative of the Peninsula proper (the area below the C&D Canal) due to the inclusion of data for Cecil County, Maryland, and New Castle County, Delaware. In

Table 1--Total population (1950, 1960, and 1970, plus 1976 projections) and rural population (1950, 1960, and 1970), Delmarva Peninsula.

Subarea	1950	Total Population		1976 ^{1/}	Rural Population		Percent Rural			
		1960	1970		1950	1960	1970			
DELMARVA PENINSULA	579,840	737,463	849,868	907,200	332,299	393,337	400,319	57.3	53.3	47.1
Delaware:	318,085	446,292	548,093	582,100	118,863	153,504	152,943	37.4	34.4	27.9
Kent	37,870	65,651	81,892	91,900	29,393	52,912	50,269	77.6	80.6	61.4
New Castle	218,879	307,446	385,851	401,200	39,850	41,108	33,771	18.2	13.4	8.8
Sussex	61,336	73,195	80,350	89,000	49,620	59,484	68,903	80.9	81.3	85.8
Maryland:	210,623	243,570	258,329	278,800	165,028	192,232	203,930	78.3	78.9	78.9
Upper Shore--	99,274	121,498	131,322	141,400	86,050	105,570	110,418	86.7	86.9	84.1
Caroline	18,234	19,462	19,781	22,100	18,234	19,462	19,781	100.0	100.0	100.0
Cecil	33,356	48,408	53,291	55,100	28,111	42,419	42,672	84.3	87.6	80.1
Kent	13,677	15,481	16,146	16,900	10,534	11,879	12,670	77.0	76.7	78.5
Queen Anne's	14,579	16,569	18,422	21,600	14,579	16,569	18,422	100.0	100.0	100.0
Talbot	19,428	21,578	23,682	25,700	14,592	15,241	16,873	75.1	70.6	71.2
Lower Shore--	111,349	122,072	127,007	137,400	78,978	86,662	93,512	70.9	71.0	73.6
Dorchester	27,815	29,666	29,405	30,100	17,464	17,427	17,810	62.8	58.7	60.6
Somerset	20,745	19,623	18,924	20,000	17,057	16,083	15,849	82.2	82.0	83.8
Wicomico	39,641	49,050	54,236	60,500	24,500	32,748	38,984	61.8	66.8	71.9
Worcester	23,148	23,733	24,442	26,800	19,957	20,404	20,869	86.2	86.0	85.4
Virginia:	51,132	47,601	43,446	46,300	48,408	47,601	43,446	94.7	100.0	100.0
Accomack	33,832	30,635	29,004	30,900	31,108	30,635	29,004	91.9	100.0	100.0
Northampton	17,300	16,966	14,442	15,400	17,300	16,966	14,442	100.0	100.0	100.0

^{1/} 1976 figures derived from current Population Reports (Series P-26) September, 1977. Issued by United States Department of Commerce, Bureau of the Census

Continued

Table 1--Total population and rural population, Delmarva Peninsula,
1950, 1960, and 1970 (Continued)

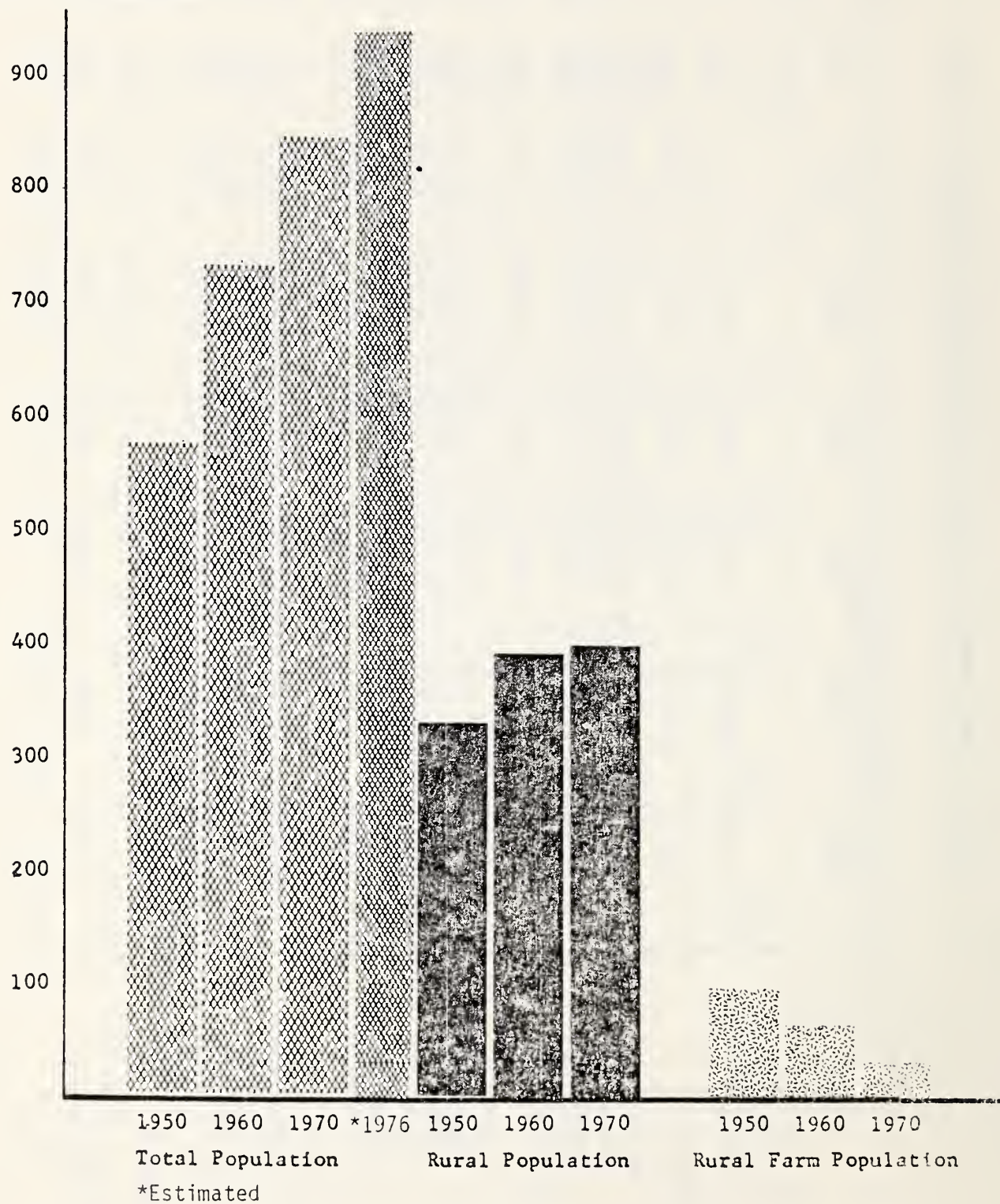
Subarea	Rural Nonfarm Population		Rural Farm Population		Percent Rural Farm ^{1/}	
	1950	1960	1950	1960	1950	1960
DELMARVA PENINSULA	233,983	332,298	98,316	61,039	17.0	8.3
Delaware:	84,638	131,683	34,225	21,821	10.8	4.9
Kent	18,989	46,165	10,404	6,294	27.5	9.6
New Castle	33,447	37,386	6,403	3,722	2.9	1.2
Sussex	32,202	47,679	17,418	11,805	28.4	16.1
Maryland:	115,049	160,473	49,979	31,759	23.7	13.0
Upper Shore---	60,170	88,198	25,880	17,372	26.1	14.3
Caroline	11,546	15,078	6,688	4,384	36.7	22.5
Cecil	21,655	38,882	6,456	3,537	19.4	7.3
Kent	7,501	9,095	3,033	2,784	22.2	18.0
Queen Anne's	9,406	12,832	5,173	3,737	35.5	22.6
Talbot	10,062	12,311	4,530	2,930	23.3	13.6
Lower Shore---	54,879	72,275	24,099	14,387	21.6	11.8
Dorchester	11,920	14,277	5,544	3,150	19.9	10.6
Somerset	12,922	13,454	4,135	2,629	19.9	13.4
Wicomico	17,052	28,307	7,448	4,441	18.8	9.1
Worcester	12,985	16,237	6,972	4,167	30.1	17.6
Virginia:	34,296	40,142	14,112	7,459	27.6	15.7
Accomack	22,485	26,035	8,623	4,600	25.5	15.0
Northampton	11,811	14,107	5,489	2,859	31.7	16.9

^{1/} As a percent of total population.

Source: Bureau of the Census, Census of Population 1950, 1960, and 1970

Figure B
Delmarva Population Trends: 1950-1970 and 1976

Population in thousands



both counties, the majority of the population resides north of the canal and, thus, outside the survey area. If these two counties are not included in the Peninsula totals, the population growth and the rural population statistics are markedly different:

<u>Area</u>	<u>Population growth 1950-1970</u>	<u>Percent rural 1950</u>	<u>Percent rural 1970</u>	<u>Population growth 1970-1976</u>	<u>Population growth 1950-1976</u>
Delmarva Peninsula (14 Counties)	46.6%	57.3	47.1	6.7%	56.5%
Delmarva Peninsula (excluding Cecil and New Castle Counties)	25.4%	80.7	78.9	1.5%	31.6%

Accordingly, one can conclude that the population of the survey area grew at a considerably slower rate than the national population over the same period and that it remained overwhelmingly rural. These conclusions are confirmed by an examination of the county data in Table 1. Between 1950 and 1970, three counties (Accomack and Northampton, Virginia, and Somerset, Maryland) actually lost population and an additional three counties gained less than 10 percent. Of the counties wholly in the survey area, only Kent County, Delaware, grew faster than the national rate.

The 1976 net migration statistics - which take into account births, deaths, and migration - reflected a continuation of the slow population growth rate trend of the previous two decades. However, some interesting differences occurred in regard to the size and rate of population change among the counties of the Peninsula. Sussex County, Delaware, with a 6,100 (7.6%) increase, experienced the largest net population gain. Closely following were Wicomico County, Maryland, with a 5,000 (9.1%) net increase and Kent County, Delaware, with a net gain of 4,000 (4.8%). The largest proportional

gain, 17 percent, occurred in Queen Anne's County, Maryland, where a 3,100 increase occurred in the third least populated county on the Peninsula. Only Cecil County, Maryland, and New Castle County, Delaware, experienced small net population decreases.

During the 26 year period between 1950 and 1976, the northern section of the Peninsula experienced relatively moderate rates of population increase. The population growth rates of the three counties comprising Delaware plus Cecil County, Maryland, ranged from 45.1 to 142.7 percent. However, in the southern section of the Peninsula - except for Wicomico County, Maryland - the average change in population was negligible. Wicomico County accounted for 20,859 (or 98%) of the 21,219 net population increase in the six county area.^{1/}

In four counties, the 1970 population was entirely rural and four others were over 80 percent rural. It is interesting to note, however, that all of the counties experienced a major shift in the rural population from the farm to the non-farm classification. In only two counties in 1970 was more than 10 percent of the population classified rural-farm whereas all but one county in 1950 had more than 10 percent in this category.

The age distribution of the Peninsula population (Table 2) in 1970 differed only slightly from that of the national population. There were proportionally more persons in the 0-19, 30-39, and 40-49 years age groups and proportionally less in the remaining age groups than in the Nation as a whole. Notably, there were proportionally fewer young adults (20-29 years age group), both male and female, in the Peninsula population than in the national population. This

^{1/} 1976 net migration figures derived from Current Population Reports (Series P-26) September 1977. Issued by United States Department of Commerce, Bureau of the Census.

Table 2—Age distribution of the Delmarva population, with
National comparison, 1970

Sex and age group(years)	Number	Percent Distribution	National Comparison ^{1/}
Male:			
0-19	166,513	40.2	101.5
20-29	57,804	13.9	94.6
30-39	47,187	11.4	102.7
40-49	50,250	12.1	102.5
50-59	43,060	10.4	102.0
60 and over	49,782	12.0	95.2
All males	414,596	100.0	
Female:			
0-19	161,727	37.1	102.5
20-29	62,209	14.3	97.3
30-39	48,919	11.2	100.9
40-49	52,887	12.2	102.5
50-59	44,719	10.3	98.1
60 and over	64,822	14.9	95.5
All females	435,283	100.0	
Both Sexes:			
0-19	328,240	38.7	102.4
20-29	120,013	14.1	95.9
30-39	96,106	11.3	101.8
40-49	103,137	12.1	101.7
50-59	87,779	10.3	99.0
60 and over	114,604	13.5	95.7
Total	849,879	100.0	

^{1/} Identical regional and national distributions imply index numbers of
100.0

Source: Bureau of the Census, 1970 Census of Population

indicates that young adults were leaving the Peninsula in search of superior employment opportunities.

The composition of age and sex within the Peninsula population has important implications for individual resource demands and economic potential. From changes in the age distribution flow important consequences for the educational, economic, social, and political life of a community. A useful device for observing these changes is the population pyramid. Figure C illustrates the percentage of males and females in 5-year age groups for the total population, the rural non-farm population, and the rural farm population. Examination of Figure C indicates that in 1970 there were fewer children under the age of 5 than in the 5-9, 10-14, and 15-19 age groups. The decline in total births was due to the combination of a declining birth rate and a reduced number of young adults. This was most evident in the rural farm population where young adults were a significantly smaller proportion of the population than their counterparts in the total population and in the rural non-farm population. This was a further indication of the migration of young adults from the farm population into the non-farm sector on the Peninsula and of young adults in general. In the age groups from 40-44 and above, there were proportionally more persons in the rural farm population in these age groups than in the rural non-farm and the total populations. This was most pronounced in the 50-54 and 55-59 year age groups.

Several short-term and long-term implications may be drawn from the age and sex structure of the Delmarva population. In the short run, the reduced number of children under five required less educational facilities as they reached school age. In many instances, facilities became underutilized -

Delmarva Age-Sex Pyramid - 1970

FEMALES

MALES

over 75

70 - 74

65 - 69

60 - 64

55 - 59

50 - 54

45 - 49

40 - 44

35 - 39

30 - 34

25 - 29

20 - 24

15 - 19

10 - 14

5 - 9

under 5

6 5 4 3 2 1 0 1 2 3 4 5 6
Percent of Population

▨ - Rural farm population

▨ - Rural non-farm population

▨ - Total population

with older schools being vacated, sold, or used for other public purposes. The declining school population resulted in the curtailment of curriculum and a reduction in overall educational opportunities. This had the greatest impact on rural areas where opportunities were already limited. At the same time, an increased proportion of citizens in the older age groups required public services, housing, and transportation responsive to their needs. The migration of young adults reduced the labor force for existing and potential employers -- aggravating existing economic problems. The 1970 age distribution focused attention on the need for long-term programs to provide economic opportunities for young adults equal to those available outside the Peninsula.

Educational levels attained by the Peninsula population 25 years old and over in 1970 were somewhat lower than those attained by the national population. As Table 3 indicates, there was a considerably larger proportion of the Peninsula population, both male and female, with less than eight years of education than in the Nation at large. Similarly, there was a slightly larger proportion of the Delmarva population with only an elementary school education. These relatively low levels of educational achievement were reflected in the low percentage of high school graduates, particularly males. The percentage of college graduates among the Peninsula population, however, was very close to the national statistic. It should be noted that the statistics presented were for the population age 25 and over. The educational achievement of the population under that age will be greater because of compulsory attendance laws and increased opportunities that were not available to the older members of the population.

Table 3--Educational achievement of the Delmarva population,
with National comparison, 1970

Highest Grade Level Completed	Peninsula Population	National Population Percent	National Comparison
Males Age 25 and Over:	100.0	100.0	--
Less than 8 years	21.2	16.6	127.7
Elem. school graduate	32.8	31.5	104.1
High School graduate	32.4	38.4	84.4
College graduate	13.6	13.5	100.7
Female Age 25 and Over:	100.0	100.0	--
Less than 8 years	16.3	13.6	119.9
Elem. school graduate	35.4	32.7	108.3
High School graduate	40.4	45.6	88.6
College graduate	7.9	8.1	97.5

1/ Identical regional and national distributions imply index numbers of 100.0

Source: Bureau of the Census, 1970 Census of Population

These educational statistics are important because unemployment problems result if the employment needs of local industry are not compatible with the job skills of the labor force. An important aspect of economic planning is to complement new industry with available job skills. Unless employment opportunities are provided locally for skilled workers, the tendency for young adults to seek employment outside the Peninsula will be exacerbated. Similarly, employment for the unskilled is a necessary ingredient for a viable local economy.

Labor Force

Labor force data (1970) for the Peninsula's male and female populations are presented in Table 4. The civilian unemployment rates in 1970 of 2.4 percent for males and 2.5 percent for females compared favorably with the national unemployment rate of 4.9 percent for both sexes combined. Females have increased their participation in the labor force from 36.9 percent in 1960 (age 14 and over) to 43.5 percent in 1970 (age 16 and over). It is unlikely that the change in age groups accounted for more than a minor fraction of the increase. Approximately 10,000 women on the Peninsula were employed in the food processing and recreation industries while an additional 3,500 women were employed in the manufacture of men's shirts and children's clothing. Women were more concentrated in these industries because much of the work was part-time, seasonal, or required skills that the male labor force had not acquired through experience or training.

An insight into labor participation and potential may be gained by examining a portion of a community economic inventory for Wicomico County, Maryland.^{1/}

Total employment in Wicomico County (1970) was approximately 22,647. The Department of Employment Security estimated average annual unemployment in Wicomico County at about 3.2 percent in calendar year 1969 - a figure fairly representative for the Peninsula as a whole. The Inventory also noted that there was a substantial potential labor force within Wicomico County. Approximately 5,213 persons in seven major components were included in the supply of labor available within Wicomico County. These were:

^{1/} Community Economic Inventory-Wicomico County, Maryland Division of Development, Annapolis, Maryland, 1971.

Table 4—Labor force by status and sex, Delmarva Peninsula,
1960 and 1970

Status and Sex	AGE 14 AND OVER(1960)		AND AGE 16 AND OVER(1970)		Percent Change 1960-1970
	Number	Percent	Number	Percent	
Male:					
In the labor force—	98,512	78.3	218,802	78.5	11.0
Military	10,848	4.3	10,122	3.6	-6.7
Civilian:	187,664	74.0	208,680	74.9	11.2
Employed	177,572	70.0	201,958	72.5	13.7
Unemployed	10,092	4.0	6,722	2.4	-33.4
Not in the labor force—	55,060	21.7	59,911	21.5	8.8
Inmate of institution	4,721	1.8	4,191	1.5	-11.2
Enrolled in school	19,521	7.7	18,258	6.6	-6.5
Other:					
Under age 65	12,385	4.9	14,582	5.2	17.7
65 and over	18,433	7.3	22,880	8.2	24.1
All males	253,572	100.0	278,713	100.0	9.9
Female:					
In the labor force—	97,266	36.9	132,603	43.5	36.3
Military	648	0.3	626	0.2	-3.4
Civilian:	96,618	36.6	131,977	43.3	36.6
Employed	90,190	34.2	124,376	40.8	37.9
Unemployed	6,428	2.4	7,601	2.5	18.2
Not in the labor force—	166,564	63.1	172,460	56.5	3.5
Inmate of institution	2,893	1.1	3,750	1.2	29.6
Enrolled in school	20,173	7.6	20,013	6.6	-0.8
Other:					
Under age 65	113,208	42.9	110,464	36.2	-2.4
65 and over	30,290	11.5	38,233	12.5	26.2
All females	263,830	100.0	305,063	100.0	15.6

Source: Bureau of the Census, 1970 Census of Population

<u>Component</u>	<u>Number</u>
1. Active unemployment insurance claimants	450
2. Unemployed, claims expired	160
3. Unemployed, not claimants for unemployment insurance	988
4. Underemployed who would shift from low paying or seasonal jobs	3,000
5. High school graduates expected to enter the labor force annually	265
6. Residents commuting to work outside the County but available in the County if comparable jobs offered	125
7. Women not now in labor force but available if jobs offered	<u>225</u>
Estimated total potential	5,213

In 1970, more than seventy-eight percent of the employed population worked where they resided (Table 5). This high degree of local employment was probably related to the low population density (65 persons per/square mile) and to the rural aspect of the area.

Table 5--Place of work, Delmarva Peninsula, 1970

<u>Place of work</u>	<u>Number</u>	<u>Percent</u>
All workers	328,683	100.0
Worked in county of residence	258,154	78.6
Worked outside of county of residence	45,092	13.7
Place of work not reported	25,437	7.7

Source: Bureau of the Census, 1970 Census of Population

Income

Total personal income within the Peninsula increased approximately 1.2 billion dollars from 1950 to 1971 (Table 6).^{1/} This growth enabled the

^{1/} Total personal income is the current income received by residents of an area from all sources. It is measured before deduction of income and other personal taxes but after deduction of personal contributions to social security, government retirement and other social insurance programs.

Table 6--Personal income, per capita income, and employment, Delmarva Peninsula,
selected years 1950-71^{1/2}

Item	1950	1960	1970	1971
	--1967 dollars--			
Total personal income (1,000 dollars)	\$423,700	\$665,300	\$1,570,500	\$1,667,700
Percent of national total	0.18	0.17	0.19	0.19
Population, July 1	329,400	377,500	412,100	418,000
Per capita income	1,286	1,762	3,811	3,990
Percent of national per capita income	86.0	82.0	97.0	96.0
Total employment	130,396	144,266	185,542	2/
Percent of population employed	39.6	38.2	45.0	2/

1/ Not including Cecil County, Maryland, and New Castle County, Delaware.
2/ Not available

Source: U.S. Department of Commerce, Bureau of Economic Analysis

Peninsula to increase its share of the national income from .18 percent to .19 percent. The modest increase indicated that a pattern of slow, steady growth was taking place in the area.

Per capita income was derived by dividing total income by the midyear population of the area. On the Delmarva Peninsula per capita income increased from \$1,286 in 1950 to \$3,990 in 1971 (Table 6). Per capita income is the average return for participation in the economic activity of an area. Thus, changes in per capita income reflect the balance between rates of growth in population and income. The per capita income of the Peninsula has been historically less than that of the Nation; however, personal income increased from 86 percent of that for the Nation in 1950 to 96 percent in 1971.

In 1970, average family income on the Delmarva Peninsula (Table 7) was more than the national average. However, there were a greater percentage of families living on the Peninsula with incomes less than the poverty level than was representative of the Nation. Although the mean income level of the poverty families was slightly more than the respective national figure, the average income for unrelated individuals fell below the comparable national figure.

The mean income level of the poverty families and unrelated individuals was proportionally below the respective mean incomes for all families or persons. The poverty level families had mean incomes of 18.8 percent of the all family mean. Poor unrelated individuals fared only slightly better at 22.5 percent of the unrelated individual mean. The comparisons are even more discouraging when it is noted that inmates of institutions, members of the armed forces in barracks, college students in dormitories, and unrelated

Table 7--Income and poverty status of families and unrelated individuals,
Delmarva Peninsula and United States, 1970

	(Current dollars)			
	Delmarva Peninsula		United States	
	Number	Mean Income	Number	Mean Income
All families:	213,990	\$10,775	51,168,599	\$9,590
Families with incomes less than the poverty level	23,541	\$2,028	5,462,216	\$1,935
Percent of all families	11.0	18.8	10.7	20.2
All unrelated individuals:	74,718	\$3,637	16,052,389	\$3,889
Individuals with incomes less than the poverty level	24,504	\$817	5,944,956	\$861
Percent of all individuals	32.8	22.5	37.0	22.1

Source: Bureau of the Census, 1970 Census of Population

individuals fourteen years of age and under are excluded from these definitions. There were a substantial number of persons with low incomes and this consuming group required a different mix of housing, recreation, transportation and job opportunities than persons with higher incomes.

Housing Conditions

A 1970 comparison between the general housing conditions on the Delmarva Peninsula and in the United States (Table 8) revealed a greater percentage of seasonal housing and other vacant units on the Peninsula. This was not unusual insofar as a large part of the Peninsula is utilized for recreation and seasonal or second homes are numerous. Of the year round units that existed on the Peninsula in 1970, more than 10 percent lacked some or all plumbing facilities while the national percentage was approximately 7 percent.

Table 8--General housing conditions, Delmarva Peninsula, 1970

Item	Delmarva Peninsula		U. S. Percent
	Number	Percent	
Total population:			
Population in units	849,868	100.0	100.0
Population in group quarters	823,330	96.9	97.1
	26,538	3.1	2.9
All housing units:	293,589	100.0	100.0
Vacant--seasonal or migratory ^{1/}	13,071	4.5	1.5
All year units--	280,518	95.5	98.5
Owner-occupied	175,999	59.9	58.1
Renter-occupied	83,459	28.4	34.3
Vacant for sale or rent	8,537	2.9	3.1
Other vacant ^{2/}	12,523	4.3	3.0
All-year units:	280,518	100.0	100.0
With all plumbing facilities	250,426	89.3	93.1
Lacking some or all plumbing	30,092	10.7	6.9
Occupied units:	259,458		
Units with 1.01 or more persons per room	16,481	6.4	8.2

^{1/} Beach houses, hunting cabins, etc. and units used solely to house migratory labor.

^{2/} Houses vacant for any reason other than sale or rent, condemned units, or other units unfit for habitation, are not included as any type of housing unit.

Source: Bureau of the Census, 1970 Census of Population.

THE GENERAL ECONOMY

Data for the period 1950 through 1970 suggest that the Delmarva Peninsula continued to experience a transition from an essentially agrarian economy to a modern mixed economy based on manufacturing and services in addition to agriculture. It should be noted, however, that this phase of economic growth did not begin on the Peninsula until relatively late in its economic development. Early industrial growth in the Middle Atlantic region occurred in proximity to sources of power and raw materials. The Peninsula, like the Coastal Plain in general, lacked the topography necessary for water power and had no deposits of coal or important minerals. It did, however, have the soils and temperate climate that encouraged intensive agricultural development. Similarly, abundant forest resources supported the development of a large forestry sector and the surrounding waters yielded large harvests of shellfish, crabs, and finfish. The location of the Peninsula with respect to major urban markets was also propitious. With the advent of railroads and, later, highway systems, transportation of the Peninsula's products shifted from ships and barges to the land modes. Because of its geography, however, the Peninsula was still relatively isolated and this discouraged the development of a diversified manufacturing sector. Typical of most agricultural areas, the Peninsula during the period had a labor surplus. Some of this surplus was absorbed by labor-intensive manufacturing enterprises such as clothing and apparel, but the remainder left the Peninsula in search of superior employment opportunities.

Completion of the Chesapeake Bay Bridge in 1952 marked a significant turning point in the Peninsula's economic development. The Bridge represented a major improvement in the Peninsula's accessibility with respect to the Baltimore - Washington, D.C., metropolitan area and states to the west and

south. The economic impact was two-fold. First, industrial development was stimulated by removal of the impediment to east-west travel posed by the Bay (despite ferry service). Second, the Bridge provided ready access to the Eastern Shore and the Atlantic beaches for residents of the Baltimore-Washington area. The Peninsula had historically been a popular area for summer recreation, but the increased demand for recreation created by rising incomes and increased leisure time was a powerful stimulus for further recreational development of the resources of the Peninsula once the Bridge became available for use. The opening of the Bridge-Tunnel at the mouth of the Bay in 1965 further improved accessibility -- particularly into the southern half of the Peninsula.

Along with the transportation improvements made in the 1950's and 1960's, other forces and events acted to transform the Delmarva economy. The national economy - which experienced considerable growth and change following World War II - profoundly influenced the rate of growth and pattern of change in the economy of the Delmarva region. A national trend that had a particularly important local impact was the increasing consumption of services relative to goods. In the immediate post-war years, federal, state, and local government expenditures and employment expanded significantly reflecting an increased demand for public services. The Dover, Delaware, area benefited directly from the growth of state government activity as well as from the reactivation of Dover Air Force Base in 1951 and its continued operation as a major Military Airlift Command facility. All parts of the Peninsula, however, shared the overall stimulus provided by increased governmental expenditures. Increased demand for recreation services also had a considerable impact on the Peninsula. To some extent, this impact was focused on development of the

Atlantic Coast resorts of Ocean City, Maryland, and Rehoboth Beach, Delaware. However, the entire Peninsula provided quality recreation and recreational development was widespread.

One result of the changed structure of the regional economy was that it significantly affected the distribution of population among the towns and cities of the Peninsula. By 1970 two major growth centers had emerged. In the northern half of the Peninsula, Dover, Delaware became the principal center for wholesale and retail trade and the supply of specialized urban services. In part this was due to a locational advantage, but the expansion of state government in the capital city and increased activity at the Air Base caused very rapid population growth. As Table 9 indicates, the 1970 population of 17,488 was about one and one-half times larger than the population only ten years earlier. In 1960, Dover ranked third among the cities and towns on the Peninsula in terms of population.

Table 9--Population and population rank of Delmarva cities and towns, 1960 and 1970^{1/}

City,	County,	State	Population		Percent Change 1960-70	Rank	
			1960	1970		1960	1970
Dover	Kent	Delaware	7,250	17,488	141.2	3	1
Salisbury	Wicomico	Maryland	16,302	15,252	-6.4	1	2
Cambridge	Dorchester	Maryland	12,239	11,595	-5.3	2	3
Easton	Talbot	Maryland	6,337	6,809	7.4	4	4
Seaford	Sussex	Delaware	4,430	5,537	25.0	6	5
Milford	Sussex	Delaware	5,795	5,314	-8.3	5	6

^{1/} 1970 populations of 5,000 persons or more

Source: U.S. Dept. of Commerce, 1970 Census of Population

In the southern half of the Peninsula, Salisbury, Maryland serves as a major regional trade center. Strategically located at the junction of U.S. Routes 13 and 50, Salisbury benefited from the ever-increasing flow of traffic to Ocean City and shore points. The population of Salisbury proper decreased slightly from 1960 to 1970 and the city slipped to second in the ranking of Peninsula cities by population. However, due to the development of unincorporated tracts of land beyond the city, the population of the entire metropolitan Salisbury area increased somewhat over the 1960 level. Of the remaining Delmarva cities and towns with populations in excess of 5,000, only Seaford, Delaware, and Easton, Maryland had positive population growth rates between 1960 and 1970 (Table 9).

Employment

Some insight into the changes that occurred in the economy of the Peninsula between 1950 and 1970 is provided by an examination of employment trends among and within industry sectors over time. Though this approach ignores structural interdependencies among sectors and obscures the effects of inter-regional economic developments on the local economy, it does provide a revealing overview of the magnitude and composition of changes in the industrial structure of the region.

Peninsula employment by industry sector for 1950 and 1970 is shown in Table 10. Also shown in Table 10 are the absolute and percentage changes in employment by industry between 1950 and 1970 and the present distribution of total employment over industry sectors in each year. Total employment in the twelve counties below the canal increased by 33,562 (or 25.7 percent) over the 1950-70 period.^{1/} This was essentially the same as the relative increase in

^{1/} Statistics presented in this section exclude data for Cecil County, Maryland, and New Castle County, Delaware.

Table 10--Employment by industry sector, 1950 and 1970, and change in industry employment, 1950-1970, Delmarva Peninsula.

Industry	1950		1970		Change 1950-1970	
	Number	Percent of Total	Number	Percent of Total	Number	Percent
Agriculture, Forestry, and Fisheries	35,363.	27.1	15,159.	9.2	-20,204.	-57.1
Mining	63.	*	140.	0.1	77.	122.2
Contract Construction	9,375.	7.2	13,393.	8.2	4,018.	42.9
Manufacturing	28,838.	22.2	40,515.	24.7	11,677.	40.5
Food and kindred products mfg.	10,109.	7.8	15,038.	9.2	4,929.	48.8
Textile and Apparel products mfg.	5,100.	3.9	7,042.	4.3	1,942.	38.1
Lumber, wood products, furniture mfg.	5,035.	3.9	1,470.	0.9	-3,565.	-70.8
Printing and publishing	605.	0.5	2,345.	1.4	1,740.	287.6
Chemicals and allied products mfg.	2,794.	2.1	4,040.	2.5	1,246.	44.6
Electrical and other machinery mfg.	520.	0.4	2,881.	1.8	2,361.	454.0
Motor vehicles and equipment mfg.	496.	0.4	1,213.	0.7	717.	144.6
Other and miscellaneous mfg.	4,179.	3.2	6,486.	3.9	2,307.	55.2
Transportation, Communications, and Utilities	7,048.	5.4	8,584.	5.2	1,536.	21.8
Railroads and railway express	1,182.	0.9	361.	0.2	-821.	-69.5
Trucking and warehousing	2,097.	1.6	2,481.	1.5	384.	18.3
Other transportation	1,482.	1.1	1,658.	1.0	176.	11.9
Communications	1,037.	0.8	1,712.	1.0	675.	65.1
Utilities and sanitary service	1,250.	1.0	2,372.	1.5	1,122.	89.8
Wholesale and Retail Trade	20,855.	16.0	31,143.	19.0	10,288.	49.3
Wholesale trade	4,500.	3.4	6,229.	3.8	1,729.	38.4
Food and dairy products stores	3,891.	3.0	4,122.	2.5	231.	5.9
Eating and drinking places	2,428.	1.9	3,610.	2.2	1,182.	48.9
Other retail trade	10,036.	7.7	17,182.	10.5	7,146.	71.2
Finance, Insurance and Real Estate	2,266.	1.7	4,526.	2.8	2,260.	99.7
Services	18,868.	14.5	35,601.	21.7	16,733.	88.7
Hotels and other personal services	3,329.	2.6	5,072.	3.1	1,743.	52.4
Private households	5,156.	4.0	3,843.	2.3	-1,313.	-25.5
Business and repair services	2,926.	2.2	2,939.	1.8	13.	0.4
Entertainment, recreation services	679.	0.5	1,192.	0.7	513.	75.6
Medical, other professional services	6,778.	5.2	22,555.	13.8	15,777.	232.8

Continued

Table 10--Employment by industry sector, 1950 and 1970, and change in industry employment, 1950-1970, Delmarva Peninsula (Continued).

Industry	1950		1970		Change 1950-1970	
	Number	Percent of Total	Number	Percent of Total	Number	Percent
Public Administration	3,622.	2.8	8,416.	5.1	4,794.	132.4
Armed Forces	1,735.	1.3	6,481.	4.0	4,746.	273.5
Industry not reported	2,363.	1.8	0.	0.0	0.	0.0
Delmarva Peninsula Total	130,396.	100.0	163,958.	100.0	33,562.	25.7

Source: Growth Patterns in Employment by County, 1940-1950 and 1950-1960, Vol. 2., U.S. Department of Commerce/Office of Business Economics (Washington, D.C., 1965).
Bureau of the Census, 1970 Census of Population.

population of 25.4 percent. The increase in total employment implies that there was an average annual growth rate of only 1.2 percent. Within industrial sectors, changes in employment over the period varied much more widely than total employment. A closer examination of the data in Table 10 reveals industry growth rates ranged from -70.8 percent to 454.0 percent. Trends in major sectors are outlined below.

Agriculture. Direct employment in agriculture, forestry, and fisheries experienced the largest absolute decline of all major sectors in the Delmarva economy. Total employment fell from 35,363 in 1950 to 15,159 in 1970, a 57.1 percent decrease. In 1950, one Peninsula job in four was in the agricultural sector. In 1970, however, less than one job in ten was directly related to agriculture (including forest and fish cultivation). In part, the decline reflected national trends of increased mechanization and increased farm size, but regional shifts in cropping patterns away from the production of labor intensive truck crops also occurred. As the regional economy grew, rising wage rates for unskilled and semi-skilled labor resulted in less direct agricultural employment as farm operators shifted to the production of field crops or left agriculture in favor of non-farm employment.

Mining. Employment in mining more than doubled over the twenty-year period, but total mining employment remained a very small fraction of all employment. Most mining activity was in sand and gravel operations supplying the construction industry.

Construction. Reflecting overall growth of the Delmarva economy and the high level of building activity associated with recreational development, construction employment increased by 42.9 percent between 1950 and 1970. As a proportion of all employment, however, construction employment was only one percentage point greater at the end of the period.

Manufacturing. In 1950, the manufacturing sector was the second largest employer on the Peninsula with total sector employment exceeded only by employment in agriculture, forestry, and fisheries. By 1970, however, the manufacturing sector was the primary employer - employing nearly one-quarter of the workers on the Delmarva Peninsula. Employment growth over the period totaled 11,677 or 40.5 percent. Subsector employment patterns showed some notable changes. The food manufacturing subsector, for example, had an increase in employment of 48.8 percent despite the precipitous decline of direct employment in agriculture. This was indicative of the continued importance of agriculture to the economy of the Peninsula and the changed nature of the agricultural output of the area. Vertically integrated broiler production became the dominant feature of Delmarva agriculture, particularly in the south half of the Peninsula. These firms provided employment in every stage of broiler raising and processing - from the hatchery to the final market. Other subsectors which demonstrated substantial employment growth were printing and publishing, machinery, and motor vehicles and transportation. Manufacturing employment in the lumber and wood products sub-sector, on the other hand, declined even more sharply than employment in the forestry sector.

Transportation, Communications, and Public Utilities. The relative increase in employment in this sector paralleled population growth over the period. Subsector employment trends, however, varied considerably. Employment in the railroad and express subsector, for example, decreased by 69.5 percent while the utilities subsector had an employment increase of 89.8 percent and the communications subsector increased 65.1 percent. The decline in railroad employment followed directly from the reduced importance of rail freight movement once highway access to the Peninsula was improved by the

opening of the Bay Bridge and other modernization projects. The growth of the communications and utilities subsectors reflected the underlying growth of the Peninsula's non-farm economy and increased standard of living.

Wholesale and Retail Trade. There were 31,143 workers employed in wholesale and retail trade in 1970. This sector accounted for nearly a fifth (19.0%) of Delmarva employment and had increased by 49.3% since 1950. Retail trade activity was most prevalent in areas of population concentration. Consequently, Dover and Salisbury became major retail trade centers because they possessed the largest urban areas in terms of population. Retail trade activity was also seasonally important along the Atlantic beaches, especially in Ocean City and Rehoboth Beach, and in other centers of recreation activity along the Chesapeake shoreline and throughout the Peninsula. Dover and Salisbury developed into important wholesaling centers, but wholesale trade activity also occurred in proximity to production centers for Peninsula exports, particularly broilers, seafood, and vegetables.

Finance, Insurance, and Real Estate. Employment in financial services was another indicator of the degree of growth experienced in the non-farm economy of the Delmarva Peninsula. Total employment in the sector doubled between 1950 and 1970 reflecting a high level of general business activity, increased personal income, and growth in the demand for seasonal and vacation homes.

Services. The largest absolute increase in sector employment between 1950 and 1970 occurred in the services sector. With 1970 employment of 35,601, the services sector was the second largest employer on the Peninsula, exceeded only by the manufacturing sector. Over the two decades, services employment increased by 16,733 or 88.7 percent. This increase alone was

sufficient to absorb more than 80 percent of the jobs lost in agriculture. Only one subsector, private households, showed a net decrease in employment. This decrease followed a national trend. Both the hotel subsector and the entertainment and recreation subsector experienced substantial growth in employment both in response to the increasing number of visitors to the area and in response to rising personal incomes and increased leisure time gained by the Peninsula population.

The most significant indicator of the growth of the Delmarva economy and the structural changes that were both a cause of growth and a consequence of growth was the change in medical and professional employment. Employment in this subsector, composed of medical services, legal services, education, and other professional services, more than tripled over the twenty-year period and had a large absolute increase as well - accounting for over 90 percent of the change in all service employment. Demand for professional services was a function of both population and income. The relatively small increase in Peninsula population over the same period explained only a fraction of the increase that actually occurred. In the post World War II years, however, increased personal incomes were used to purchase higher levels of services, both public and private. General levels of education and health care improved dramatically from 1950 to 1970 as a result of both higher standards and consumer preferences.

Public Administration. The growth of the government sector on the Peninsula was reflected by the substantial increase in employment in public administration. Sector employment more than doubled between 1950 and 1970. The growth of government employment was due to both the increased demand for social services and the expanded base of social overhead capital represented by bridges, highways, schools, courthouses, prisons, and other public

structures and institutions.

Armed Forces. The almost three-fold increase in armed forces employment resulted from the reactivation of Dover Air Force Base in 1951 and its subsequent growth. Dover AFB is the home base for the 36 C-5 Galaxies of the 436th Military Airlift Wing of the Military Airlift Command. The C-5, with a payload in excess of 80 tons, is the world's largest aircraft. These aircraft, along with the personnel and support facilities at Dover AFB, are an integral part of U.S. strategic airlift capability.

Overall, employment on the Peninsula grew very slowly in the years between 1950 and 1969. As detailed above, however, significant shifts in employment by industry sector did occur. Employment in agriculture, forestry, and fisheries declined by more than 50 percent, but increased employment in other sectors was sufficient to absorb both displaced workers in agriculture and new entrants in the Peninsula labor force. Total non-farm employment rose from 95,033 in 1950 to 148,799 in 1970, an increase of 56.6 percent. The employment statistics, however, grossly understated the economic growth on the Peninsula. Earnings data which reflected the effect of both increased employment and increased labor productivity provided a more accurate measure of growth.

Earnings

Peninsula earnings by industry sector for 1950 and 1969 are shown in Table 11.^{1/} Also shown in Table 11 are the distributions of total earnings across industry sectors and the absolute and percentage changes in earnings between 1950 and 1969. Total earnings increased by 115.4 percent between

^{1/} Earnings are stated in 1967 dollars to correct for changes in the general price level between 1950 and 1969.

Table 11--Earnings by industry, 1950 and 1969, and changes
in industry earnings, 1950-1969, Delmarva Peninsula

	(In thousands of 1967 dollars)				
	1950		1969		Change 1950-1969
	Dollars of Total	Percent of Total	Dollars of Total	Percent of Total	
Agriculture, Forestry, and Fisheries	149,436.	30.6	169,740.	16.1	20,304.
Mining	440.	0.1	722.	0.1	282.
Contract Construction	23,581.	4.8	48,148.	4.6	24,567.
Manufacturing	99,308.	20.3	238,611.	22.7	139,303.
Transportation, Communications, and Utilities	26,359.	5.4	52,312.	5.0	25,953.
Wholesale and Retail Trade	90,375.	18.5	153,404.	14.6	63,029.
Finance, Insurance, and Real Estate	8,277.	1.7	22,503.	2.1	14,226.
Services	40,298.	8.2	106,414.	10.1	66,116.
Public Administration	39,560.	8.1	205,091.	19.5	165,531.
Armed Forces	11,007.	2.3	55,355.	5.2	44,348.
Delmarva Peninsula Total	488,641.	100.0	1,052,300.	100.0	563,699.

Source: U.S. Department of Commerce, Bureau of Economic Analysis

1950 and 1969 while employment in the comparable period grew by only 25.7 percent and population by only 25.4 percent. The resulting change in real per capita incomes was similarly dramatic (see Table 6).

Changes in earnings by industry sector between 1950 and 1969 presented some interesting contrasts with the employment data. For example, the agricultural sector had a 13.6 percent increase in earnings despite a 57.1 percent decrease in employment. The implied increase in productivity was the result of both the adoption of new technology and changed farm organization. Although the agricultural sector had an increase in earnings during the period, its share of total earnings fell from 30.6 percent to 16.1 percent. Earnings data above, however, understated the continued importance of agriculture in the Delmarva economy since other industry sectors are particularly dependent upon agriculture as a source of raw materials or as a market for finished goods. As Table 10 indicates, more than a third of all manufacturing employment (and, presumably, a similar function of earnings) was related to food packing and processing - primarily seafood, vegetables, and poultry. Similarly, a significant fraction of earnings in the trade, services, and other sectors flowed from the sale of inputs to agriculture.

Other notable differences between the change in earnings and the change in employment among sectors occurred in the two sectors most closely related to government expenditures - public administration and armed forces. Both of these sectors experienced an increase in real earnings in excess of 400 percent between 1950 and 1969. This was further evidence of the impact of government spending on the economic growth of the Peninsula. The increase in earnings in the two sectors was substantially greater than the underlying increases in employment. In the early years of the period, government workers, both civilian and military, were underpaid relative to comparable employees

in the private sector. The achievement of comparability occurred in the latter part of the period and was reflected in the earnings data for the two sectors.

While the Peninsula economy expanded rapidly during the years from 1950 to 1969, the national economy also grew. As the following data indicates, Peninsula earnings as a percent of U.S. earnings decreased between 1950 and 1959, but increased between 1959 and 1969:

<u>Year</u>	<u>Delmarva Earnings - Percent of U.S. Total</u> ^{1/}
1950	0.189
1959	0.172
1969	0.190

These statistics indicate that the national growth rate exceeded the Peninsula growth rate between 1950 and 1959 and that between 1959 and 1969 the Peninsula economy grew more rapidly than the national economy, as measured by earnings growth.

Wage Rates

For three decades the national growth of the labor force outpaced the creation of new jobs on the Peninsula. The consequences were both an out-migration of workers in search of employment and the exertion of downward pressure on the Delmarva wage rates. Table 12 shows median hourly earnings for selected occupations obtained during 1973 and 1977 area wage surveys by the Bureau of Labor Statistics of the U.S. Department of Labor. A small part of the Wilmington Standard Metropolitan Statistical Area (SMSA) was part of the study area (those portions of Cecil and New Castle Counties south of the C&D Canal), but the structure of the economy of the region would suggest

^{1/} Source: U.S. Department of Commerce, Bureau of Economic Analysis

Table 12--Representative wage rates for selected occupations, Delmarva Peninsula, 1973 and 1977

Occupation	(Median hourly earnings)			
	Lower Eastern Shore ^{1/}		Wilmington SMSA ^{2/}	
	1973	1977	1973	1977
Electronic technicians	\$5.34	\$6.69	\$5.75	\$8.00
Carpenters, maintenance	5.34	7.65	6.04	7.70
Machinists, maintenance	4.39	7.65	4.96	7.70
Mechanics, automotive (maintenance)	3.35	4.55	5.50	7.70
Mechanics, maintenance	5.34	7.65	5.03	7.10
Drafters	N.A.	4.70	N.A.	6.75
Truckdrivers, all	2.76	3.75	5.52	6.45
Secretaries	3.07	4.38	4.84	5.92
Truckers, power (forklift)	2.90	5.76	4.49	5.22
Computer operators	N.A.	5.50	N.A.	5.15
Switchboard operators	2.38	2.94	3.27	4.33
Laborers, material handling	2.97	3.15	3.52	4.20
Stenographers, general	2.69	3.61	3.28	4.05
Key punch operators, class B	2.40	3.50	3.19	3.95
Typists, class B (routine copy typists)	2.31	3.05	2.95	3.62
Janitors, porters and cleaners	2.35	3.33	2.95	2.75
Guards and watchmen	2.10	2.30	3.03	2.45

N.A. indicates not available.

^{1/} Somerset, Wicomico, and Worcester counties, Maryland; Accomack and Northampton counties, Virginia; and Sussex County, Delaware

^{2/} New Castle County, Delaware; Salem County, New Jersey; and Cecil County, Maryland

Source: U.S. Department of Labor, Bureau of Labor Statistics, Area Wage Surveys

that the wage rates in the lower half of the Peninsula were more representative of the Peninsula as a whole. In any case, considerable variation in local wage rates existed due to labor market conditions.

Between 1950 and the early 1970's, despite the growth in the economy during the latter part of the period, a labor surplus remained in the area. In 1973 hourly wages for both male and female workers averaged 20-25 percent lower in the southern part of the Peninsula than in the Wilmington SMSA. With one exception - maintenance mechanics skilled in agricultural equipment repair - wage rates were lower for every occupation, both male and female, in the lower shore area.

Between 1973 and 1977 the wage structure on the lower Peninsula changed somewhat. This may have been attributable, in part, to the fact that there was a moderate improvement in new job creation, the region experienced a modest net migration gain, and the economy of the area continued to experience steady growth.

In 1977 wage rates in the Wilmington SMSA still generally exceeded those in the lower Peninsula. Interestingly, in several categories - electronic technicians, auto mechanics, and material handlers - the 1977 wage differentials were greater than those in 1973. However, the average wage differential between the Lower Eastern Shore and the Wilmington SMSA in 1977 decreased to less than twenty percent. Wage rates were at or near parity in several occupational categories - the most notable being carpenters and machinists. In four of the seventeen categories - maintenance mechanics; computer operators; forklift drivers; and janitors, porters, and cleaners - wage rates in the Lower Eastern Shore area exceeded those in the Wilmington SMSA.

Conditions in the labor market - high demand and short supply - may have accounted for the relatively higher wage rate for skilled maintenance mechanics and forklift operators on the Peninsula. Additional monetary compensation may have been necessary to induce highly trained computer operators to locate on the relatively rural Delmarva Peninsula - a region lacking some of the amenities of more highly urbanized metropolitan areas. Between 1973 and 1977 an oversupply of relatively unskilled workers depressed the average hourly wage rate for janitors, porters, and cleaners 6.8 percent - from \$2.95 to \$2.75 - in the Wilmington SMSA. During an identical time period, the average wage rate for the same type of activity on the Lower Eastern Shore increased over 40 percent from \$2.35 to \$3.33. This combination of factors enabled janitors, porters, and cleaners on the Peninsula to earn over 20 percent more in wages than their counterparts in the Wilmington SMSA in 1977.

AGRICULTURE

Despite an appreciable decrease in farm employment and share of earnings since 1950, the agricultural sector continues to provide a substantial number of employment and income opportunities. Agriculture still remains the major economic force within the Delmarva Peninsula supporting an agri-business complex that includes hatcheries, feed mills, and processing plants of integrated broiler firms; vegetable canning and freezing plants; and suppliers of machinery, fertilizer, and other farm inputs. Numerous individuals are employed and receive income directly from agriculture and allied industries for performing tasks primarily associated with producing, harvesting, and marketing farm and farm-related products. In addition, the agricultural sector indirectly generates other employment and income opportunities. Many individuals are employed by and receive income from business concerns which supply the non-farm goods and services demanded by the agricultural sector. The total amount of jobs and earnings that can be directly or indirectly attributed to agriculture and related industries is substantial and only partly indicated by statistics of the agricultural sector per se. The continuing viability of Delmarva agriculture contrasts sharply with other parts of the Northeast where agriculture has been displaced by residential and commercial development and by changes in national production patterns. As the data presented below indicates, Delmarva agriculture has been subjected to similar pressures.

Because the portions of Cecil and New Castle counties that are part of the survey area are primarily agricultural, data for these two counties as a whole have been included in the analysis. In addition, data for the Upper and Lower Shore areas of Maryland are presented separately to reflect the differences in climate, soils, and type of farming that distinguish the two areas.

Farm Characteristics

Following national trends, the Peninsula experienced a considerable decrease in the number of farms between 1959 and 1974 and a moderate decrease in the acreage of land in farms (Table 13). Average size of farm over the same period increased by 35 percent from 156.7 acres in 1959 to 212 acres in 1974. The decline in the number of farms was relatively uniform over the counties of the survey area and was the direct result both of the adoption of labor-saving technology with its accompanying increase in the size of optimal management units and of the availability of off-farm employment opportunities. The acreage of land in farms decreased for two distinct but related reasons. Land will be used for agricultural purposes only when returns to land in agriculture exceed its return in competing uses. Some land in farms on the Peninsula was lost to residential, commercial, and industrial development despite its relatively high agricultural value. The remaining decrease in farm acreage resulted from changes in agricultural values that led to either outright abandonment or a change to less intensive use.

Average size of farm in 1974 varied considerably among Peninsula counties ranging between 120 acres in Wicomico County, Maryland, to 391 acres in Kent County, Maryland. Farms in the Upper Shore area of Maryland were of a considerably larger average size than those of the Lower Shore. In three counties on the Lower Shore of Maryland the average size of farms was greater than 320 acres. The greatest change in average size between 1959 and 1974 occurred in Accomack County, Virginia, where a 48 percent decrease in farm numbers and only a 14 percent decrease in land in farms resulted in a 65 percent increase in average size of farm. Figure D further illustrates Peninsula trends in number of farms, land in farms, and average size of farm.

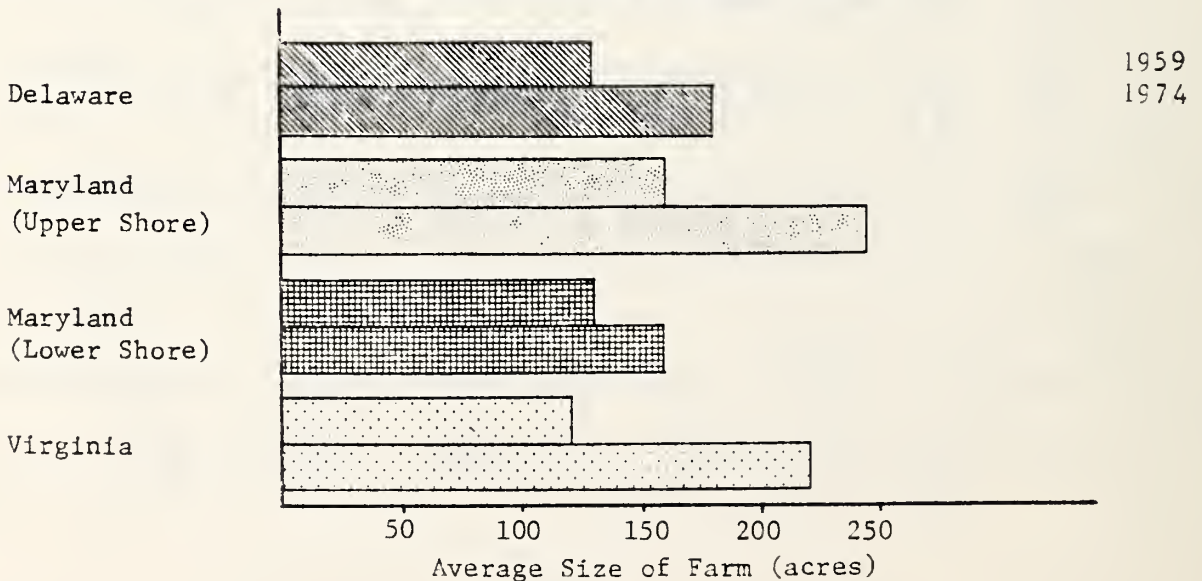
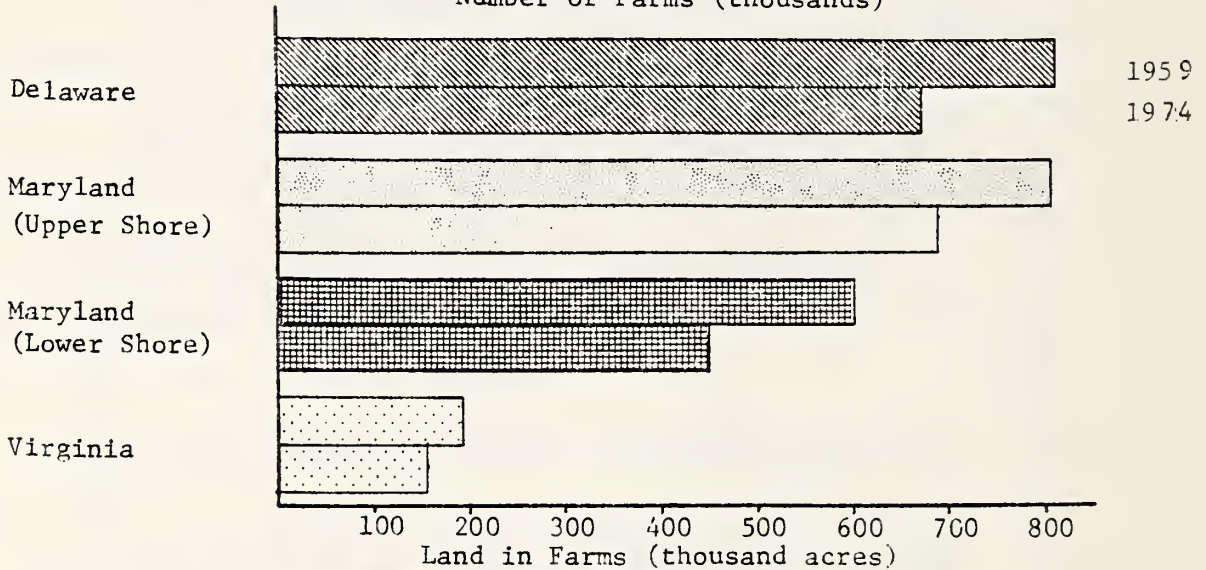
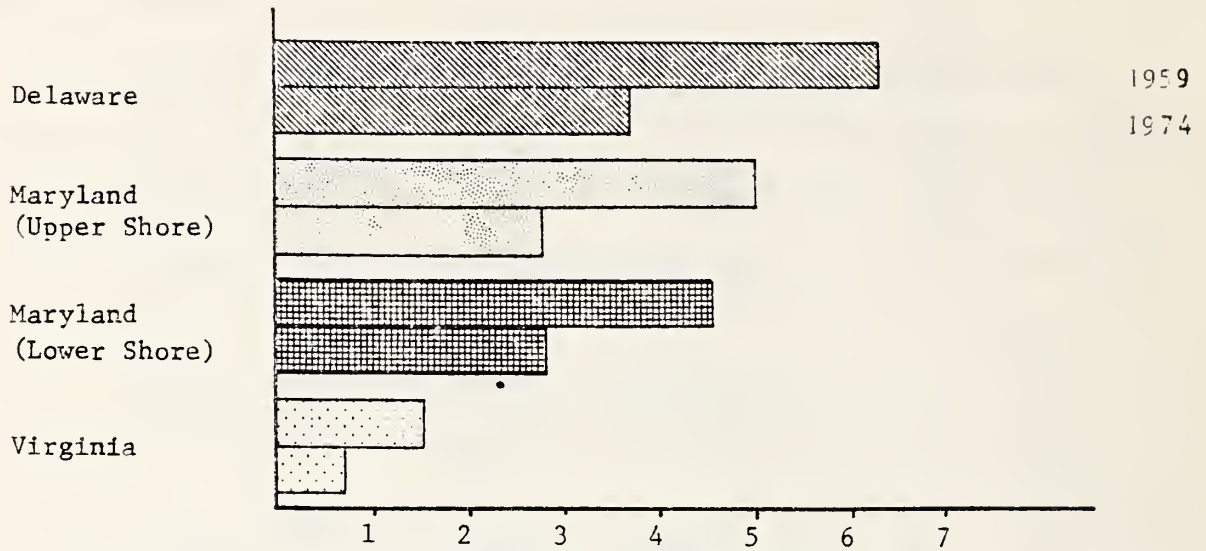
Table 13--Number of farms, land in farms, and average size of farm, Delmarva Peninsula, 1959, 1964, 1969, and 1974

Subarea	Number of Farms				Land in Farms				Average Size of Farm			
	1959	1964	1969	1974	1959	1964	1969	1974	1959	1964	1969	1974
-----Acres-----												
DELMARVA PENINSULA	14,220	11,605	10,041	8,876	2,228,790	2,097,216	1,970,755	1,880,426	156.7	180.7	196.3	212
Delaware:	5,208	4,401	3,710	3,400	762,526	717,015	673,895	630,605	146.4	162.9	181.6	185
Kent	1,533	1,219	1,073	976	251,834	232,125	219,788	196,410	164.3	190.4	204.8	201
New Castle	739	564	516	432	129,650	121,055	113,251	100,172	175.4	214.6	219.4	232
Sussex	2,936	2,618	2,121	1,992	380,942	363,835	340,856	334,023	129.7	139.0	160.7	168
Maryland:	7,837	6,199	5,624	4,826	1,287,007	1,205,970	1,140,669	1,095,429	164.2	194.5	202.8	227
Upper Shore--	3,929	3,125	2,816	2,443	766,219	721,065	690,655	652,212	195.0	230.7	245.3	267
Caroline	1,177	923	817	740	156,771	144,855	132,782	128,788	133.2	156.9	162.5	174
Cecil	832	659	541	480	138,649	127,455	113,710	99,158	166.6	193.4	210.1	207
Kent	538	470	488	352	149,968	145,865	148,420	137,458	278.8	310.4	304.1	391
Queen Anne's	812	641	551	497	182,772	177,695	170,589	166,087	225.1	277.2	309.5	334
Talbot	570	432	419	374	138,059	125,195	125,154	120,721	242.2	289.8	298.6	323
Lower Shore--	3,908	3,074	2,808	2,383	520,788	484,905	450,014	443,217	133.3	157.7	160.3	186
Dorchester	729	616	516	456	157,050	150,065	139,583	147,302	215.4	243.6	270.5	323
Somerset	663	573	470	435	85,528	78,610	69,744	69,618	129.0	137.2	148.3	160
Wicomico	1,418	1,061	1,037	851	131,363	116,475	112,545	102,523	92.6	109.8	108.5	120
Worcester	1,098	824	785	641	146,847	139,755	128,142	123,774	133.7	169.6	163.2	193
Virginia:	1,175	1,005	707	650	179,257	174,231	156,191	154,392	152.6	173.4	220.9	238
Accomack	805	690	466	420	112,191	114,185	105,031	96,708	139.4	165.5	225.3	230
Northampton	370	315	241	230	67,066	60,046	51,160	57,684	181.3	203.3	212.2	251

Source: Bureau of Census, Census of Agriculture, 1959, 1964, 1969, and 1974.

Figure D

Delmarva Farm Trends
1959 - 1974



The statistics presented in Table 14 on type of farm indicate the changes in Delmarva agriculture that occurred between 1959 and 1974 and the distribution of farm types across Peninsula subareas. In 1959, the predominate farm types were poultry, cash-grain, dairy, and general farms, in that order, with distinct differences among the subareas in the distribution of these types. In the Delaware subarea, poultry farms were the predominate farm type followed by cash-grain and dairy farms. In the Upper Shore subarea, dairy farms predominated with cash-grain and poultry farms being secondary specialties. The ranking in the Lower Shore was poultry, cash-grain, and general farms. In the Virginia subarea, poultry and cash-grain farms predominated. Interestingly, there were only 10 dairy farms in the Virginia subarea in 1959 and only slightly more than 100 in the Lower Shore subarea of Maryland.

By 1974, cash-grain farms had become the most numerous type of farm on the Peninsula followed closely by poultry farms. In 1959, these two types comprised 40.5 percent of all Delmarva farms, but by 1974, had almost doubled, with 79.1 percent of all farms being devoted to either cash-grain or poultry production. The number of dairy and general farms on the Peninsula decreased by over half both in absolute and percentage terms. Dairy operations ceased to exist entirely in Virginia. Cash-grain and dairy farms continued to be most prevalent in the northern half of the Peninsula with poultry and cash-grain farms predominating in the southern half. Vegetable farms, while decreasing in absolute number on the Peninsula, actually increased in percentage terms in Delaware and Virginia. While cash-grain farms predominate, 12.1 percent of all farms in Virginia are devoted to vegetable production.

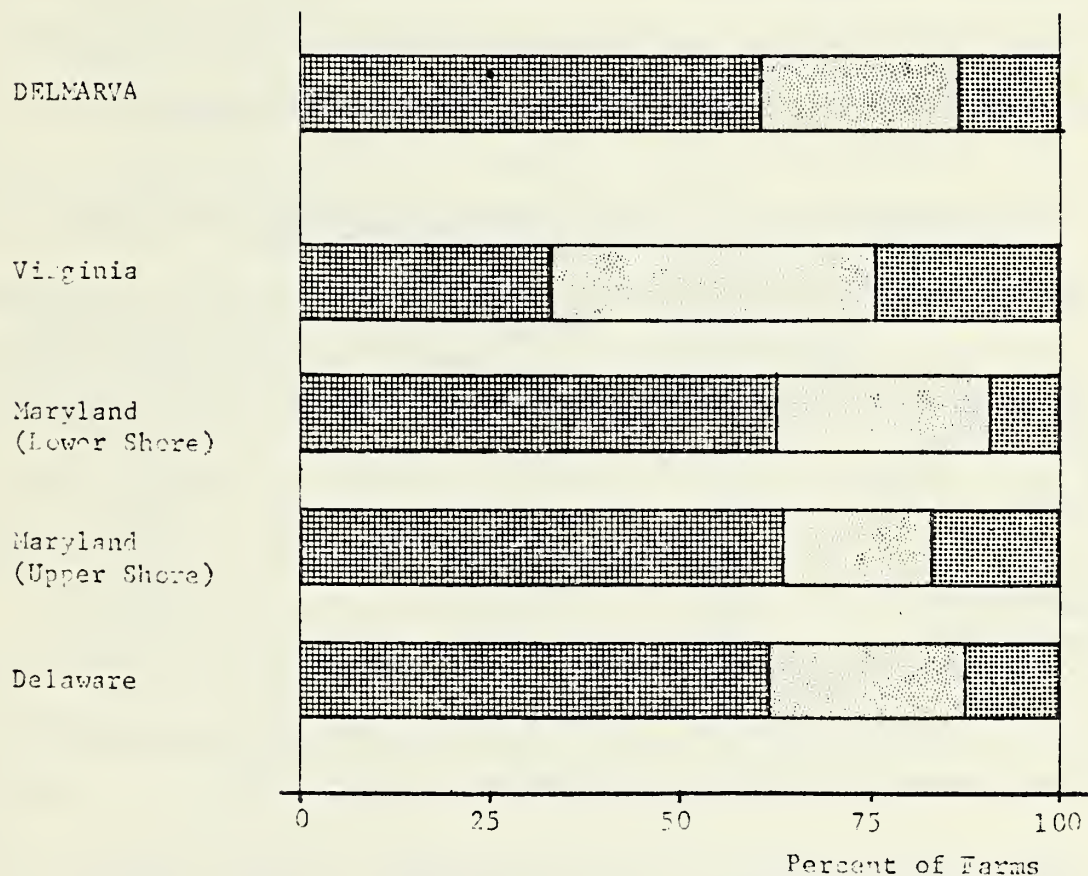
The tenure of farm operators in 1974 is illustrated in Figure E. For the Peninsula as a whole, 59.4 percent of all operators were full owners,

Table 14--Type of farm and percent distribution, Delmarva Peninsula and subareas, 1959 and 1974

Item	Delmarva		Delaware		Maryland		Md. Upper Shore		Md. Lower Shore		Virginia	
	1959	1974	1959	1974	1959	1974	1959	1974	1959	1974	1959	1974
All Farms	14,221	7,896	5,203	2,988	7,758	4,323	3,863	2,117	3,895	2,206	1,260	585
Cash-Grain	2,643	3,893	980	1,414	1,545	2,209	807	1,297	738	912	118	270
Dairy	1,951	501	728	167	1,213	334	1,105	312	108	22	10	0
Poultry	3,258	2,354	1,526	1,004	1,595	1,281	366	208	1,229	1,073	137	69
Other Livestock	488	301	145	114	321	175	228	123	93	52	22	12
Vegetable	419	241	106	70	204	100	54	47	150	53	109	71
General	822	186	269	52	469	104	261	50	208	54	84	30
All Other	4,640	420	1,449	167	2,411	120	1,042	80	1,369	40	780	133
-----Percent-----												
All Farms	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Cash-Grain	18.6	49.3	18.8	47.3	19.9	51.1	20.9	61.3	19.0	41.3	9.4	46.2
Dairy	13.7	6.3	14.0	5.6	15.6	7.7	28.6	14.7	2.8	1.0	.8	.0
Poultry	22.9	29.8	29.3	33.6	20.6	29.6	9.4	9.8	31.6	48.6	10.9	11.8
Other Livestock	3.4	3.8	2.8	3.8	4.1	4.1	5.9	5.8	2.4	2.4	1.7	2.1
Vegetable	3.0	3.1	2.0	2.4	2.6	2.3	1.4	2.2	3.8	2.4	8.6	12.1
General	5.8	2.4	5.2	1.7	6.1	2.4	6.8	2.4	5.3	2.5	6.7	5.1
All Other	32.6	5.3	27.9	5.6	31.1	2.8	27.0	3.8	35.1	1.8	61.9	22.7

Source: Bureau of the Census, Census of Agriculture, 1959 and 1974

Figure E
Delmarva Farm Tenure
1974



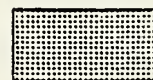
Full Owners



Part Owners



Tenants



28.2 percent were part owners, and 12.4 percent were tenants. Subareas exhibited little variation in tenure pattern with the exception of the Virginia subarea where full owners comprised only 38.5 percent of all farm operators with part owners and tenants a more common form of tenure than in the remainder of the Peninsula.

Despite the continued viability of Delmarva agriculture, a sizable number of farm operators reported off-farm work in 1974 (Table 15).

Table 15--Farm operators reporting off-farm work, number and percent of all operators, Delmarva Peninsula and subareas, 1974

Subarea	Reporting all off-farm work	Percent of all farm operators	Reporting off-farm work of 100 days or more
DELMARVA PENINSULA	3,381	39.2	3,051
Delaware	1,387	41.9	1,174
Maryland:	1,832	39.0	1,494
Upper Shore	934	39.3	743
Lower Shore	898	38.8	751
Virginia	162	26.0	125

Source: Bureau of the Census, 1974 Census of Agriculture

Approximately 39 percent of all farm operators worked off-farm in 1974. While almost 42 percent reported off-farm work in the Delaware subarea, only 26 percent of all operators in the Virginia subarea were similarly employed. For the Peninsula as a whole, 83 percent of those reporting off-farm work were employed for 100 days or more. The seasonality of labor requirements for cash-grain production and the labor required to manage a modern broiler house are both amenable to part time or full time work in non-farm occupations where job opportunities are available.

Crop and Livestock Production

The economic importance of agriculture on the Peninsula is illustrated in Table 16. Sales of all farm products in 1974 totaled 616.9 million dollars, an increase of 165.9 percent over 1959. Sales of all crops accounted for about one-third of total sales with sales of livestock, poultry, and dairy products accounting for the remaining two-thirds. Crop sales increased by 151.7 percent between 1959 and 1974 with field crop sales exhibiting the largest absolute and percentage increases in sales. All crops had a net sales increase of at least 140 percent except for fruits and nuts which experienced a 9 percent rise in sales. Livestock and dairy product sales more than doubled between 1959 and 1974. The major portion of the rise was due to increased sales of poultry and poultry products. Of all livestock and dairy products only the Other Livestock and Products category had a net decrease in sales over the period.

The distribution of crop and livestock sales over the Peninsula subareas reflected the increased importance of cash-grain and poultry production and the decreased importance of dairy production. Increased sales of all crops were particularly notable in the Upper Shore subarea where field crop sales rose five times while sales of forest products and horticultural specialties increased a phenomenal 540 percent. The Lower Shore subarea had an increase in sales of poultry and poultry products of 268 percent over the 1959 to 1974 period and all subareas except the Upper Shore of Maryland more than doubled sales of livestock sold alive.

Crop Production. Production of all major crops increased between 1959 and 1974 with the exception of all hay and sweet potatoes (Table 17). Wheat, corn, and soybean production increased by 96.8 percent, 38.1 percent, and 86.5

Table 16--Sales of farm products, 1959 and 1974, and percent change in sales, 1959-1974,
Delmarva Peninsula and subareas

Item	Delmarva Peninsula		Delaware		Maryland		Md. Upper Shore		Md. Lower Shore		Virginia	
	1959	1974 ^{1/}	1959	1974 ^{1/}	1959	1974 ^{1/}	1959	1974 ^{1/}	1959	1974 ^{1/}	1959	1974 ^{1/}
	Thousand dollars											
All Farm Products:	232,047	616,923	94,262	250,158	117,350	313,333	52,067	150,536	65,283	162,797	20,435	53,432
All Crops--	78,587	277,804	26,791	87,486	35,150	146,904	16,963	85,495	18,187	61,409	16,646	43,414
Field Crops	53,559	236,010	18,085	72,964	25,425	130,925	13,388	76,438	12,037	54,487	10,049	32,121
Vegetables	16,269	39,436	4,572	13,332	6,364	14,925	2,806	8,518	3,558	6,407	5,333	11,179
Fruits & Nuts	2,107	2,296	656	1,190	794	991	167	477	627	514	657	115
Forest & Hort. Spec.	6,649	16,542	3,478	6,178	2,565	8,727	602	3,857	1,964	4,870	506	1,637
Livestock & Dairy--	150,067	381,023	67,471	156,493	79,413	216,149	34,502	61,183	44,911	154,966	3,183	8,381
Livestock Sold Alive ^{2/}	12,109	23,201	3,846	8,613	7,847	13,740	5,809	8,019	2,038	5,721	416	848
Dairy Products	19,475	31,882	8,301	8,783	11,097	23,059	9,667	21,337	1,430	1,762	77	--
Poultry & Products	98,967	323,754	47,012	139,337	49,348	178,005	9,344	30,803	40,004	147,202	2,607	7,412
Other Livestock & Prod.	19,516	1,968	8,312	760	11,121	1,204	9,682	1,024	1,439	180	83	4
	Percent											
All Farm Products:	165.9		165.4		167.0		189.1		149.4		161.5	
All Crops--	253.5		226.5		317.9		403.5		237.7		160.8	
Field Crops	340.7		303.5		414.9		470.9		352.7		219.6	
Vegetables	142.4		191.6		134.5		203.6		80.1		109.6	
Fruits & Nuts	9.0		81.4		24.8		185.6		-18.0		-82.5	
Forest & Hort. Spec.	148.8		77.6		240.2		540.7		148.0		170.1	
Livestock & Dairy	153.9		131.9		172.2		77.3		245.1		163.3	
Livestock Sold Alive ^{2/}	91.6		123.9		75.1		38.0		180.7		103.8	
Dairy Products	63.7		5.8		108.2		120.7		23.2		-100.0	
Poultry & Products	227.1		194.3		260.7		229.7		268.0		184.3	
Other Livestock & Prod.	-89.9		-90.9		-69.2		-89.4		-87.5		-95.2	

1/ 1974 data is for Class 1-5 farms. These farms accounted for more than 99% of the sales of all farm products in 1974.

2/ Cattle & Calves, Hogs & Pigs, Sheep & Goats

Source: Bureau of Census, Census of Agriculture, 1959 and 1974.

Table 17--Production of major crops, 1959 and 1974, and percent change in production, 1959 to 1974, Delmarva Peninsula and subareas. ^{1/}

Crop	Unit	Delmarva Peninsula		Maryland		Md. Upper Shore		Md. Lower Shore		Virginia	
		1959	1974	1959	1974	1959	1974	1959	1974	1959	1974
Corn ^{1/}	1,000 bu.	20,650.0	38,835.8	7,038.2	10,756.0	13,175.1	27,138.0	8,683.4	16,731.1	4,491.7	10,406.9
Wheat	1,000 bu.	2,481.3	4,883.3	617.9	1,447.5	1,826.4	2,737.8	1,511.6	2,237.9	314.8	499.9
Small Grains ^{1/}	1,000 bu.	3,016.4	3,626.2	905.9	1,218.6	1,967.7	2,217.9	1,369.2	1,283.4	598.5	934.5
Soybeans	1,000 bu.	8,281.9	15,447.4	3,246.2	5,386.5	4,176.6	8,575.3	1,471.7	4,703.9	2,704.9	3,865.4
All Hay	100 tons	2,075.4	1,274.6	621.4	416.2	1,419.8	844.8	1,195.6	727.9	224.2	116.9
Irish Potatoes	1,000 cwt.	4,308.9	4,427.6	1,611.9	1,282.3	366.5	111.9	119.1	22.9	247.3	88.9
Sweet Potatoes	1,000 bu.	3,719.2	1,576.5	42.2	17.7	882.2	288.0	14.0	20.1	868.2	267.9
----- Percent ^{2/} -----											
Corn		88.1	52.8	106.0	92.7	131.7	115.7				
Wheat		96.8	134.3	49.9	48.0	58.8	1,786.5				
Small Grains		20.2	34.5	12.7	-6.3	56.1	32.8				
Soybeans		86.5	65.9	105.3	220.0	42.9	72.9				
All Hay		-38.6	-33.0	-40.5	-39.1	-47.9	-60.5				
Irish Potatoes		2.8	-20.4	-69.5	-80.8	-64.1	30.2				
Sweet Potatoes		-57.3	-58.1	-67.4	-43.6	-69.1	-54.5				

^{1/} 1974 production from farms with sales of \$2,500 and over.

^{2/} Percent calculated by first subtracting the 1959 from the 1974 figure then dividing the difference by the 1959 figure.

Source: Bureau of Census, Census of Agriculture, 1959 and 1974.

percent, respectively. The Upper Shore subarea had a three-fold increase in soybean production mirroring the shift to grain production noted above. Wheat production doubled on the Peninsula with the Virginia subarea experiencing a phenomenal increase of 1,786.5 percent. This rise, along with the increase of 32.8 percent in small grain production in the Virginia subarea, reflects the adoption of double cropping of winter wheat and barley with vegetable crops and the use of two-year rotations of corn, winter grain, and soybeans. Multiple crop rotations are also being adopted in the Lower Shore subarea. Total Irish potato production on the Peninsula increased 2.8 percent between 1959 and 1974. Interestingly, every subarea except Virginia experienced at least a 20 percent decrease in Irish potato production. In Virginia, Irish potato production increased 30.2 percent. By 1974 nearly seven of every ten Irish potatoes produced on the Delmarva Peninsula were grown in Virginia.

Data on the acreage of major crops as a percent of harvested cropland are presented in Table 18. Corn and soybeans were grown on 84 percent of harvested cropland in 1974 as opposed to 63 percent in 1959. The proportions of cropland devoted to all other crops except wheat decreased between 1959 and 1974. Cropping patterns in 1974 were similar across Delmarva subareas with the exception of the Virginia subarea. In the two Virginia counties, 41 percent of harvested cropland was devoted to production of vegetables, Irish potatoes, and sweet potatoes. Soybeans were grown on an additional 48 percent of cropland, wheat on 13 percent, and only 8 percent of cropland was in corn.

Major crop acreages by county for Census years between 1959 and 1974 are presented in Table 19. These data give a further indication of the general

Table 18--Acreages of major crops as a percent of harvested cropland, 1959 and 1974, Delmarva Peninsula and subareas

Crop	Delmarva Peninsula		Delaware		Maryland		Maryland Upper Shore		Maryland Lower Shore		Virginia	
	1959	1974	1959	1974	1959	1974	1959	1974	1959	1974	1959	1974
All Corn	34.5	36.9	35.5	35.1	38.3	42.4	40.7	42.7	34.5	42.0	7.5	8.4
Corn for Grain	32.7	35.0	33.9	33.4	36.0	40.2	37.6	39.4	33.6	41.4	7.2	8.1
Corn for Silage	1.6	1.9	1.4	1.7	2.0	2.2	2.9	3.3	.7	.6	.2	.3
Soybeans for Beans	28.8	47.4	33.8	46.5	25.0	47.8	14.3	36.0	41.6	67.0	33.1	47.9
Wheat	7.9	9.7	5.8	9.1	10.3	9.4	14.0	12.2	4.5	4.8	1.1	13.7
Small Grains	7.9	6.1	7.0	6.3	8.9	6.4	9.8	5.7	7.5	7.4	5.5	3.8
Vegetables for Sale	10.6	6.8	10.1	7.5	8.1	4.7	6.3	5.1	10.8	4.1	27.9	17.5
Irish Potatoes	2.5	2.2	1.9	1.4	.4	.1	.1	*	.8	.2	17.7	18.8
Sweet Potatoes	1.5	.5	.1	*	.5	.1	*	*	1.3	.3	13.6	4.6
All Other Crops ^{1/}	6.3	-9.6	5.8	-5.9	8.5	-11.2	14.8	-1.7	-1.0	-25.8	-6.4	-14.7

^{1/} Totals may not add up to 100% and/or negative percentages may occur due to double cropping - especially of soybeans, wheat, and small grains.

* Indicates not available.

Source: Bureau of Census, Census of Agriculture, 1959 and 1974.

Table 19--Harvested acreage of major crops, Delmarva Peninsula, 1959, 1964, 1969, and 1974.

Area	All Corn				Corn for Grain				Corn Silage			
	1959	1964	1969	1974	1959	1964	1969	1974	1959	1964	1969	1974
----- Acres -----												
DELMARVA PENINSULA	414,008	455,565	513,918	486,097	392,345	418,163	489,638	461,332	19,691	34,290	24,280	24,755
Delaware:	147,737	161,512	180,353	158,655	141,261	150,849	172,817	150,931	5,954	9,857	7,536	7,724
Kent	43,911	52,479	48,471	40,049	40,653	47,237	45,144	36,236	3,100	4,903	3,327	3,813
New Castle	21,451	22,883	26,684	20,914	19,491	19,796	24,784	18,892	1,901	2,963	1,900	2,022
Sussex	82,375	86,150	105,198	97,692	81,117	83,816	102,889	95,003	953	1,991	2,309	1,889
Maryland:	258,204	286,041	324,876	317,789	243,307	259,649	308,463	301,042	13,523	24,212	16,413	16,747
Upper Shore---	167,654	185,324	197,805	197,818	154,967	161,673	183,218	182,679	11,751	22,439	14,587	15,139
Caroline	28,435	32,871	31,599	26,737	26,537	29,322	29,483	25,092	1,610	3,224	2,116	1,645
Cecil	21,936	23,370	26,821	26,252	19,929	18,274	21,863	20,301	2,873	4,941	4,958	5,351
Kent	38,229	41,120	45,288	52,702	35,599	35,482	41,992	48,982	2,558	5,424	3,296	3,720
Queen Anne's	42,773	47,521	54,516	56,517	39,354	40,571	51,457	53,242	3,127	6,499	3,059	3,275
Talbot	36,281	40,442	39,581	35,610	34,448	38,024	38,423	34,462	1,583	2,351	1,158	1,148
Lower Shore---	90,550	100,717	127,071	119,971	88,340	97,976	125,245	118,363	1,772	1,773	1,826	1,608
Dorchester	27,073	32,089	40,669	35,750	26,563	31,326	40,157	35,300	502	728	512	450
Somerset	10,652	9,969	16,766	16,874	9,999	9,314	16,327	16,354	541	455	439	520
Wicomico	22,200	23,590	29,318	27,368	21,913	23,024	29,213	27,129	107	143	105	239
Worcester	30,625	35,069	40,318	39,979	29,865	34,312	39,548	39,580	622	442	770	399
Virginia:	8,067	8,012	8,689	9,653	7,777	7,665	8,358	9,359	214	221	331	294
Accomack	6,242	5,925	7,365	8,215	6,012	5,730	7,097	7,928	182	120	268	287
Northampton	1,825	2,087	1,324	1,438	1,765	1,935	1,261	1,431	32	101	63	7

Continued

Table 19--Harvested acreage of major crops, Delmarva Peninsula, 1959, 1964, 1969, and 1974.

	Soybeans for Beans				Wheat				Small Grains			
	1959	1964	1969	1974	1959	1964	1969	1974	1959	1964	1969	1974
----- Acres -----												
DELMARVA PENINSULA	344,615	395,384	364,886	623,074	94,753	74,490	68,021	127,396	95,105	93,596	86,158	80,828
Delaware:	140,643	147,720	142,711	209,977	23,958	18,494	17,377	41,216	29,414	29,702	29,358	28,600
Kent	44,292	54,226	52,917	66,252	10,474	7,529	6,627	13,355	12,889	11,974	12,472	10,272
New Castle	5,972	12,943	17,281	31,451	8,762	7,893	7,378	9,435	5,285	5,396	3,757	2,048
Sussex	90,379	80,551	72,513	112,274	4,722	3,072	3,372	18,426	11,240	12,332	13,129	16,280
Maryland:	168,272	199,299	185,705	358,085	69,605	55,003	48,825	70,480	59,778	58,180	50,217	47,891
Upper Shore--	58,949	89,903	91,734	166,867	57,702	45,437	41,302	56,803	40,185	38,101	30,994	26,662
Caroline	27,925	34,327	31,373	49,565	10,518	8,304	7,137	12,274	9,329	10,523	10,877	11,550
Cecil	915	4,098	5,746	10,840	7,080	6,035	5,422	6,782	6,392	4,248	3,628	3,172
Kent	5,584	11,317	15,735	25,517	10,611	8,577	8,548	10,218	6,654	6,001	5,276	3,530
Queen Anne's	9,698	18,766	20,739	41,419	15,141	12,725	11,712	16,723	10,203	9,826	6,993	5,344
Talbot	14,827	21,395	18,141	39,526	14,352	9,796	8,483	10,806	7,607	7,503	4,220	3,066
Lower Shore--	109,323	109,396	93,971	191,218	11,903	9,566	7,523	13,677	19,593	20,079	19,223	21,229
Dorchester	36,860	34,517	32,610	54,184	9,892	8,381	6,890	9,597	9,053	10,291	10,554	12,525
Somerset	13,748	16,404	15,811	18,663	607	388	223	960	2,510	2,356	2,253	2,443
Wicomico	35,139	31,971	24,673	34,592	323	320	255	2,153	3,753	4,460	4,129	3,148
Worcester	23,576	26,504	20,877	29,595	1,081	477	155	967	4,277	2,972	2,287	2,113
Virginia:	35,700	48,365	36,470	55,012	1,190	993	1,819	15,700	5,913	5,714	6,583	4,337
Accomack	28,688	36,858	28,231	35,487	1,032	694	1,201	6,860	2,900	3,665	5,081	2,732
Northampton	7,012	11,507	8,239	19,525	158	299	618	8,840	3,013	2,049	1,502	1,605

Continued

Table 19--Harvested acreage of major crops, Delmarva Peninsula, 1959, 1964, 1969, and 1974. (Continued)

Area	Vegetables for Sale				Irish Potatoes				Sweet Potatoes			
	1959	1964	1969	1974	1959	1964	1969	1974	1959	1964	1969	1974
-----Acres-----												
DELMARVA PENINSULA	126,557	122,761	108,366	88,990	29,774	30,380	34,784	28,574	18,438	15,824	12,078	6,297
Delaware:	42,135	43,805	39,234	33,722	8,056	8,065	7,658	6,247	215	106	143	48
Kent	14,658	10,060	11,436	14,169	5,862	5,517	5,881	5,226	28	13	11	8
New Castle	4,280	4,954	3,581	1,910	1,989	2,401	1,688	870	0	3	0	0
Sussex	23,197	28,791	24,217	17,643	205	147	89	151	187	90	132	40
Maryland:	54,347	50,915	45,657	35,165	2,657	1,659	1,237	769	3,541	2,675	2,121	950
Upper Shore--	26,015	27,134	27,019	23,571	609	410	325	122	65	39	125	13
Caroline	9,097	10,922	9,207	7,787	100	1	2	5	28	14	115	5
Cecil	2,096	1,679	2,124	1,047	224	227	140	103	0	0	0	0
Kent	7,665	8,109	9,406	9,396	210	176	165	1	0	0	0	2
Queen Anne's	3,572	3,363	3,736	3,803	73	5	18	5	37	25	10	6
Talbot	3,585	3,061	2,546	1,538	2	1	0	8	0	0	0	0
Lower Shore--	28,332	23,781	18,638	11,594	2,048	1,249	912	647	3,476	2,636	1,996	937
Dorchester	10,815	10,320	6,209	4,267	21	18	5	4	104	106	142	85
Somerset	5,137	3,691	2,671	2,092	511	456	188	6	49	10	0	0
Wicomico	7,796	6,177	6,557	3,916	126	265	156	6	2,645	2,154	1,656	830
Worcester	4,584	3,593	3,201	1,319	1,390	510	563	631	678	366	198	22
Virginia:	30,075	28,041	23,475	20,103	19,061	20,656	25,889	21,558	14,682	13,043	9,814	5,299
Accomack	9,934	11,891	11,671	9,545	9,941	11,448	16,275	13,298	10,242	7,846	5,591	2,194
Northampton	20,141	16,150	11,804	10,558	9,120	9,208	9,614	8,260	4,440	5,197	4,223	3,105

Source: Bureau of Census, Census of Agriculture, 1959, 1964, 1969, and 1974.

trend on the Peninsula: the increased production of soybeans and wheat; the continuing importance of corn; and the declining trend in vegetable and sweet potato production.

Livestock Production. Livestock inventory and sales numbers by county for 1959 and 1974 are presented in Table 20. With the exception of hogs and pigs, inventory numbers of livestock decreased by at least 32 percent in all categories between 1959 and 1974. The decline in the number of milk cows reflects both the decreasing importance of dairying on the Peninsula and the national trend. Decreases in inventories of cattle and calves, sheep and lambs, and horses and ponies resulted from the increasing specialization of Delmarva agriculture in cash-grain and poultry production and the subsequent decline in general farming. The decrease in the number of horses and ponies was moderated by the increasing popularity of pleasure horses, particularly in suburban areas. In Cecil County, for example, the number of horses and ponies on farms in 1974 was 48.5 percent higher than the 1959 statistic. Sales of cattle and calves and of sheep and lambs decreased considerably between 1959 and 1974, paralleling the decrease in inventory numbers.

In contrast, sales of hogs and pigs increased by 57 percent over the same period although the number of hogs and pigs in inventory was essentially the same in 1974 as it was in 1959. Producers have succeeded in increasing pigs farrowed per sow and reducing the time needed to raise a pig to market weight thereby increasing sales without a parallel increase in inventory. To some extent, the continuing growth of swine production is the result of increases in poultry production since hatchery and processing plant wastes are a ready source of animal protein for hog rations. As the county data indicates, in most cases, the greatest increases in hog sales between 1959

Table 20--Inventories and sales of livestock and poultry, Delmarva Peninsula, 1959 and 1974

Area	Cattle and Calves ^{1/}				Hogs and Pigs				Sheep and Lambs			
	Inventory		Sales		Inventory		Sales		Inventory		Sales	
	1959	1974	1959	1974	1959	1974	1959	1974	1959	1974	1959	1974
DELMARVA PENINSULA	162,635	102,144	76,450	45,346	124,655	124,126	142,295	223,092	18,265	5,594	15,329	4,091
Delaware:	49,896	30,615	26,337	14,293	38,085	42,955	43,328	82,422	4,349	1,443	4,371	901
Kent	20,324	12,614	9,771	4,932	10,216	6,105	16,098	11,930	1,440	804	540	521
New Castle	16,783	7,934	9,313	2,944	5,704	1,384	5,085	2,639	1,573	470	2,440	272
Sussex	12,789	10,067	7,253	6,417	22,165	35,466	22,145	67,853	1,336	169	1,391	108
Maryland:	108,684	69,438	48,912	30,129	80,399	73,265	91,433	127,639	11,307	3,751	9,243	2,923
Upper Shore--	89,838	56,605	39,317	24,178	49,822	24,492	58,340	47,029	7,938	2,759	6,634	2,281
Caroline	10,725	7,500	4,741	3,855	8,075	4,291	8,980	10,533	203	416	--	275
Cecil	23,805	18,999	9,516	7,502	3,872	1,258	4,695	1,624	1,069	661	2,175	510
Kent	18,801	12,659	8,775	4,971	8,550	4,742	8,111	7,426	2,066	605	1,036	448
Queen Anne's	24,153	11,994	9,852	5,371	16,952	7,959	22,418	14,700	2,343	665	1,795	513
Talbot	12,354	5,453	6,433	2,479	12,373	6,242	14,136	12,746	2,257	421	1,628	535
Lower Shore--	18,846	12,833	9,595	5,951	30,577	48,773	33,093	80,610	3,369	992	2,609	642
Dorchester	4,352	2,580	1,567	810	2,824	9,913	4,113	13,619	793	320	429	260
Somerset	4,810	3,652	1,851	1,475	6,521	3,810	6,810	8,167	586	415	580	281
Wicomico	2,476	2,673	1,727	820	7,971	17,399	8,881	30,458	481	89	370	23
Worcester	7,208	3,928	4,450	1,371	13,261	17,651	13,289	28,366	1,509	168	1,230	78
Virginia:	4,055	2,091	1,201	924	6,171	7,906	7,534	13,031	2,609	400	1,715	267
Accomack	2,738	1,204	795	426	3,386	7,127	4,669	11,427	1,264	203	790	152
Northampton	1,317	887	406	498	2,785	779	2,865	1,604	1,345	197	925	115

^{1/} Including milk cows.

Continued

Table 20--Inventories and sales of livestock and poultry, Delmarva Peninsula, 1959 and 1974. (Continued)^{4/}

Area	Milk cows		Horses and Ponies ^{2/}		Chickens ^{3/}		Broilers		Turkeys	
	1959	1974	1959	1974	1959	1974	1959	1974	1959	1974
DELMARVA PENINSULA	72,935	36,301	7,522	5,109	1,378,021	1,691,504	155.6	286.3	507.4	323.5
Delaware	23,500	10,706	3,093	2,438	725,075	701,871	71.2	124.5	412.6	319.6
Kent	10,753	5,060	1,268	1,043	127,644	113,133	3.4	4.5	113.4	.2
New Castle	8,114	3,356	622	549	112,501	85,247	.4	--	39.8	9.3
Sussex	4,633	2,290	1,203	846	485,560	503,491	67.4	120.0	259.4	310.1
Maryland:	48,746	25,421	3,637	2,560	585,839	957,544	79.6	153.8	93.2	3.9
Upper Shore--	42,683	23,166	2,006	1,794	331,314	141,712	13.7	26.7	33.5	2.4
Caroline	5,494	2,636	447	195	86,714	88,356	10.1	20.3	8.0	1.1
Cecil	11,585	7,598	575	854	112,571	34,725	*	.1	1.4	.5
Kent	9,180	5,754	220	273	24,642	5,102	--	--	3.6	.8
Queen Anne's	11,448	5,224	512	278	59,508	11,092	.4	1.1	1.1	--
Talbot	4,976	1,954	252	194	47,879	2,437	3.2	5.1	19.4	--
Lower Shore--	6,084	2,255	1,631	766	254,525	815,832	65.9	127.1	59.7	1.5
Dorchester	1,741	538	274	147	61,748	44,337	1.5	5.8	6.4	--
Somerset	1,182	901	144	99	65,089	160,605	14.1	26.5	.6	--
Wiconico	723	151	557	198	46,002	380,918	27.3	54.0	51.4	1.5
Worcester	2,438	655	656	322	81,686	229,972	23.0	40.8	1.3	**
Virginia:	668	174	792	111	67,107	32,089	4.8	8.0	1.6	--
Accomack	486	167	504	56	58,056	31,487	4.7	8.0	.5	--
Northampton	182	7	288	55	9,051	242	.1	--	1.1	--

2/ In 1969, the Horses and Mules category was renamed Horses and Ponies. Though the name changed, the types of livestock counted - horses, ponies, mules, burros, and donkeys - remained exactly the same.

3/ Prior to 1969 chickens were counted only if 4 months old and over. In 1969, the age was reduced to 3 months. While the change in classification may account for a small increase in the 1974 figure, 1959 and 1974 data can be considered as relatively comparable.

4/ Some data not directly comparable. 1959 definition includes 571,000 farms with less than \$1,000. Though comprising 20.9% of all farms contributed less than 1% of total sales. 1974 definition includes 152,000 farms with less than 6/100 of 1% of total sales.

* Less than 50,000 broilers

** Less than 50 birds.

Source: Bureau of the Census, Census of Agriculture, 1959, 1974, 1969, and 1974.

and 1974 occurred in those counties where poultry production also showed the greatest increase.

Poultry Production. Inventory or sales of poultry - chickens, broilers, and turkeys - are illustrated in Table 20. The smallest segment of the poultry industry on the Delmarva Peninsula is turkey production which has experienced a steady decline during the past twenty years. Interestingly, while turkeys were raised to some extent in every county in 1959, by 1974 turkey production in the southern portion of the Peninsula had almost ceased entirely. Turkey production had shifted northward becoming non-existent in Virginia, relatively small in the Lower Shore subarea, moderate in the Upper Shore of Maryland, and heavily concentrated in Delaware - with 98 percent of the total. Sussex County, Delaware, raises 95 percent of the entire turkey population on the Delmarva Peninsula and was the only county to experience an increase in the number produced between 1959 and 1974.

The production of chickens (primarily laying hens and started pullets) is the next largest segment of the poultry industry. Inventories of chickens 3 months old and over rose 23 percent for the Peninsula as a whole. The Lower Shore of Maryland experienced an increase of 221 percent but inventories in the remaining three subareas declined. Chicken production is most heavily concentrated in Delaware and the Lower Shore of Maryland. Wicomico County, Maryland, experienced a phenomenal 728 percent increase in chicken production between 1959 and 1974. However, Sussex County, Delaware, still contains the heaviest concentration of chickens - raising nearly one of every three produced on the whole Peninsula.

The largest and fastest growing segment of the poultry industry on the Delmarva Peninsula is broiler production. The number of broilers sold in

1974 amounted to 286.3 million birds - an increase of 84 percent since 1959. Broiler production increased in all but two Peninsula counties. The greatest increases in absolute number occurred in Sussex County, Delaware, and in the Lower Shore of Maryland. These two areas, each with an approximately equal number of birds, together account for 4 of every 5 broilers produced on the Peninsula. Within these areas integrated broiler firms have become established as the dominant force in the industry. These firms exert complete control over the production of their broilers from the breeding flocks that produce eggs for their hatcheries to the advertising that sells their product in Boston and New York. Even after chicks are placed with contract broiler producers, the integrated firms supervise their care and feeding to ensure that death losses are minimized and weight gains maximized within established quality standards. The growth and continued viability of the poultry industry can be directly attributable to increased broiler production over the past fifteen years.

Delmarva agriculture has continued to grow despite increasing competition for land and labor on the Peninsula. Its viability, in contrast to agriculture in the Northeast in general, is the direct result of the development of those facets of its productive capacity in which it enjoys a competitive advantage. Delmarva vegetables and potatoes are harvested for fresh market to coincide with the end of the harvest season in southern states, but before harvesting begins in Pennsylvania, New Jersey, and New York. Similarly, the Delmarva broiler industry has capitalized on the Peninsula's location with respect to major urban markets and the capacity of Peninsula land to produce feed grains. To date, organizational efficiency has offset the impacts on agriculture of economic growth in the remainder of the Peninsula economy. In the future,

however, rising prices for agricultural land and increasing competition for labor will impose a constraint on further expansion of agriculture unless continued innovation is forthcoming and/or institutional arrangements are adopted to modify the impact of existing trends.

LAND USE

The Delmarva Peninsula has been relatively untouched by the trend toward urbanization occurring in other rural areas adjacent to the Boston-Washington megalopolis. Agriculture is still the major single use of land on the Peninsula and imparts a distinctively rural character to the area. In the future, however, agriculture will face increasing competition for the use of land. As the urbanizing influence of the major population centers increases, the Peninsula will become the site of more permanent and vacation homes, more industry, and more commercial areas providing goods and services to a growing population. Increasing incomes, more leisure time, early retirement and added longevity have created a demand for vacation communities and retirement homes. The demand for "second homes" occurs primarily in areas where recreational opportunities and escape from the pressures of urban living are available. The Peninsula can satisfy both requirements. The surrounding waters provide excellent boating, fishing, surfing, seaside camping, beaches, and ocean bathing. The rural character of the Peninsula provides a respite from the problems and pressures associated with urban life. The Peninsula is also easily accessible from the urban centers of Philadelphia, Wilmington, Baltimore, Washington, D.C., and Norfolk.

New industry is appearing for several reasons. First, the shift in agriculture from reliance on manpower to machinery has created a pool of unemployed and underemployed labor available for use by new industrial enterprises. Second, wage rates are comparatively less on the Delmarva Peninsula than in adjacent urban areas, resulting in lower labor costs for fledgling industrial ventures locating in the region. Third, the proximity of the

Peninsula to major markets and improvements in highway access to the Peninsula have stimulated industrial growth. And, fourth, large tracts of land are available at reasonable cost, some with publicly financed improvements designed to attract new industry.

While the trend toward more intensive land use has begun on the Peninsula, the pattern of land-use today is overwhelmingly "non-urban." Throughout the foreseeable future, "extensive uses of the land resources can be expected to predominate. It must be noted, however, that development of highway frontage for residential, commercial, and industrial purposes may lead to a more urban appearance for the Peninsula than land use statistics alone would indicate.

Classification of Land Use and Data Sources

The land use areas presented in this report were estimated from maps supplied by the Delaware and Maryland State Planning Offices and the United States Geological Survey's CARETS (Central Atlantic Regional Ecological Test Sight) program. Although the degree of disaggregation in land use categories differs among the states, all follow the United States Geological Survey definition and classification scheme making aggregation to some common basis possible.

For purposes of this report, land uses were divided into three broad classifications: Urban; Agricultural; and Non-Urban, Non-Agricultural. Each broad classification is a collection of four or five specific land use categories. The following is a listing of the broad classifications, the specific land use categories, and the types of vegetation, structures, or activities which occur in each specific land use category.

I. Urban:

- A. Residential Land Use. This classification includes all residential uses with no distinction being made between single-family or multi-family units. Residential units include owner-occupied townhouses, structures with two units or more, including condominiums and other forms of multi-family ownership or rental including rooming and boarding houses, membership lodges, residence halls and dormitories, retirement homes, orphanages, religious quarters, seasonal housing (such as summer cottages), and mobile home parks and courts.
- B. Commercial Land Use. This classification includes those areas at which retail sales, office, and service activities are performed plus strip and cluster settlement areas.
- C. Industrial Land Use. Included in this category are surface mining and extraction; warehouses; junk yards; refuse disposal; contracting construction; transportation, communications, and utilities; plus manufacturing, processing, and other light, intermediate, and heavy industry.
- D. Urban Open. This classification includes educational facilities; public and private institutions; golf courses; zoos; cemeteries; urban parks; and undeveloped land within an urban setting.

II. Agricultural:

- A. Cropland. Included in this classification are cropland harvested; cultivated summer-fallow and idle cropland; land on which crop failure occurs; and cropland in soil-improvement grasses and legumes.
- B. Cropland/Pasture. This classification contains land which is used for pasture in rotation with crops or contains land which is

difficult to categorize as either exclusively Cropland or Pasture.

- C. Pasture. Land more or less permanently used for grazing.
- D. Confined Feeding Operations. Included in this category are beef cattle feedlots, dairy operations with confined feeding, poultry farms, hog feedlots, and other specialized livestock production enterprises.
- E. Other Miscellaneous Agriculture. Included in this category are farmsteads; orchards; holding areas for livestock such as corrals, breeding and training facilities on horse farms; farm lanes and roads; ditches, and similar related uses.

III. Non-Urban, Non-Agricultural:

- A. Woodlands. This category contains all commercial and non-commercial forests; land used for forestry activities and related service; and wooded areas within the confines of farms.
- B. Inland Water. Included in this classification are natural and artificial impoundments of water - ponds, lakes, or reservoirs - used for irrigation, flood control, municipal water supplies, recreation, or electric power generation.
- C. Wetlands. Included in this category are areas where the water level is at, near, or above the land surface for a significant portion of the year, such as mudflats, marshes, swamps, bogs, and potholes.
- D. Beach, Transitional, and Barren Land. This category consists of beaches - smooth sloping accumulations of sand, pebbles, and gravel along a shoreline; non-beach sand accumulations; transitional areas

in which an indeterminate change in land use is occurring - forest land cleared, wetlands drained, or acreage bared; strip mines, quarries, and gravel pits; and barren land - bare exposed rock or accumulations of rock without vegetative cover.

Peninsula Land Use

Land use acreages for the 14 counties in the survey area are shown in Table 21. Only acreages south of the Chesapeake and Delaware Canal are included for Cecil County, Maryland, and New Castle County, Delaware. Based upon acreage data, Table 22 presents land uses as a percentage of total land area. The proportion of total acreage devoted to each land use is shown by county.

Of the three broad classifications, the percentage of land in Urban use is the smallest. Only 3.5 percent of the entire Peninsula land area is devoted to urban activities. Of all land usage on the Peninsula, 42.7 percent is agricultural in nature. The largest proportion of land area is in the Non-Urban, Non-Agricultural classification. Over half (53.8%) of the land acreage on the Delmarva Peninsula is employed in uses other than urban or agricultural with Woodland (36.7%) and Wetland (15.9%) accounting for the bulk (52.6%) of this acreage.

Within the Urban classification the predominant land use is Residential. The pattern and character of Residential land use varies considerably within the Peninsula. Sussex County, Delaware, accounting for over one-sixth the total land area of the Peninsula, has the largest amount of acreage devoted to Residential use. Of all land in Sussex County, 17,500 acres or 2.9 percent is residential in nature. Kent County, Delaware, has the second greatest

Table 21--Land use acreage, Delmarva Peninsula, 1970^{1/}

Area	Urban				Agricultural			
	Residential	Commercial	Industrial	Urban Open	Total Urban	Cropland ^{3/}	Cropland Pasture	Confined Feeding
DELMARVA PENINSULA	79,098	14,800	16,514	26,295	136,707	1,347,585	163,158	24,409
Delaware:	29,163	3,405	9,448	11,495	53,511	520,870	435	3,406
Kent	9,723	1,433	3,199	5,732	20,087	195,440	0	179
New Castle ^{2/}	1,690	230	563	461	2,944	64,538	0	51
Sussex	17,750	1,742	5,686	5,302	30,480	260,892	435	3,176
Maryland:	47,143	7,541	5,936	12,847	73,467	826,715	9,302	21,903
Upper Shore	21,944	2,750	2,611	6,289	33,594	498,740	8,035	4,062
Caroline	2,653	918	51	765	4,387	102,247	7,296	2,475
Cecil ^{2/}	1,818	77	128	1,229	3,252	39,552	230	0
Kent	4,173	489	515	824	6,001	113,728	0	0
Queen Anne's	6,247	326	1,003	1,982	9,558	141,761	326	803
Talbot	7,053	940	914	1,489	10,396	101,452	183	784
Lower Shore	25,199	4,791	3,325	6,558	39,873	327,975	1,267	16,941
Dorchester	5,407	769	1,007	1,087	8,270	112,440	186	1,325
Somerset	3,375	482	203	888	4,948	48,546	279	3,857
Wicomico	7,814	1,845	1,255	1,793	12,707	79,444	359	5,841
Worcester	8,603	1,695	860	2,790	13,948	87,545	443	5,918
Virginia:	2,792	3,854	1,130	1,953	9,729	N.A.	153,421	N.A.
Accomack	2,137	2,292	1,004	1,802	7,235	N.A.	97,666	N.A.
Northampton	655	1,562	126	151	2,494	N.A.	55,755	N.A.

N.A. signifies not available.

1/ Due to the employment of various mathematical techniques, aggregate totals not always equal to the sum of subtotals.

2/ In New Castle County (Delaware) and Cecil County (Maryland) data only for acreage south of the Chesapeake and Delaware Canal.

Table 21--Land use acreage, Delmarva Peninsula, 1970

Area	Agricultural		Non-urban, non-agricultural				Beach/ Trans/ Barren	Total Non-Ur- ban, Non-Agric.	Final Total
	Other Agriculture	Misc. Agriculture	Total Agriculture	Woodland	Inland Water	Wetland			
DELMARVA PENINSULA	9,324	1,577,207	1,382,828	18,063	436,489	13,708	1,851,088	3,565,002	
Delaware:	7,757	556,331	399,652	7,246	85,345	4,072	496,315	1,106,157	
Kent	2,968	204,882	110,690	2,508	42,246	384	155,828	380,797	
New Castle	1,715	71,168	29,977	896	14,592	358	45,823	119,935	
Sussex	3,074	280,281	258,985	3,842	28,507	3,330	294,664	605,425	
Maryland:	1,464	867,352	838,798	10,049	220,923	2,816	1,072,586	2,013,405	
Upper Shore--	925	519,698	303,482	3,256	17,384	0	324,122	877,414	
Caroline	51	114,442	84,082	306	1,582	0	85,970	204,799	
Cecil	0	42,624	25,805	589	1,306	0	27,700	73,576	
Kent	773	115,944	52,756	902	6,157	0	59,815	181,760	
Queen Anne's	75	143,642	79,873	728	4,917	0	85,518	238,718	
Talbot	26	103,046	60,966	731	3,422	0	65,119	178,561	
Lower Shore--	539	347,654	535,316	6,793	203,539	2,816	748,464	1,135,991	
Dorchester	0	114,057	152,781	4,374	91,714	0	248,869	371,196	
Somerset	51	52,911	90,315	736	63,569	0	154,620	212,479	
Wicomico	410	86,259	127,195	640	16,371	26	144,232	243,198	
Worcester	78	94,427	165,025	1,043	31,885	2,790	200,743	369,118	
Virginia:	103	153,524	144,378	768	130,221	6,820	282,187	445,440	
Accomack	103	97,769	105,957	541	84,972	4,326	195,796	300,800	
Northampton	0	55,755	38,421	227	45,249	2,494	86,391	144,640	

3/ The Virginia state classification system includes all cropland and pasture acreage in one category - cropland/pasture; acreage not divided into separate cropland and pasture components.

Source: Developed from land use maps obtained from the Delaware and Maryland State Planning Offices (1970); The U.S. Geological Survey C.A.R.E.T.S. (Central Atlantic Regional Ecological Test Sight) Program (1970) for Virginia; and the 1964 U.S. Census of Agriculture as a reference for land acreage bases. Tables 21-23 generated by John Wenderoth - Land Use Planner - U.S.D.A., E.S.C.S., Broomall, PA.

Table 22--Land use as a percent of total land area, Delmarva Peninsula, 1970

Area	Urban					Agricultural				
	Residential	Commercial	Industrial	Urban		Total Urban	Cropland	Pasture	Pasture	Confined Feeding
				Open	Percent					
DELMARVA PENINSULA	1.8	.5	.5	.7	3.5		29.4	11.7	.9	.4
Delaware:	2.6	.3	.9	1.0	4.8		47.1	.0	2.2	.3
Kent	2.6	.4	.8	1.5	5.3		51.3	.0	1.7	.0
New Castle	1.4	.2	.5	.4	2.5		53.8	.0	4.1	.0
Sussex	2.9	.3	.9	.9	5.0		43.1	.1	2.1	.5
Maryland:	2.3	.4	.3	.6	3.7		41.2	.5	.4	1.0
Upper Shore--	2.5	.3	.3	.7	3.8		56.8	.9	.9	.5
Caroline	1.3	.4	.0	.4	2.1		49.9	3.6	1.2	1.2
Cecil	2.5	.1	.2	1.7	4.4		53.8	.3	3.9	.0
Kent	2.3	.3	.3	.5	3.3		62.6	.0	.8	.0
Queen Anne's	2.6	.1	.4	.8	4.0		59.4	.1	.3	.3
Talbot	3.9	.5	.5	.8	5.8		56.8	.1	.3	.4
Lower Shore--	2.2	.4	.3	.6	3.5		28.8	.1	.1	1.5
Dorchester	1.5	.2	.3	.3	2.2		30.3	.0	.0	.4
Somerset	1.6	.2	.1	.4	2.3		22.8	.1	.1	1.8
Wicomico	3.2	.8	.5	.7	5.2		32.7	.1	.1	2.4
Worcester	2.8	.5	.3	.9	4.5		28.3	.1	.1	1.9
Virginia:	.6	.9	.3	.4	2.2		N.A.	^{1/} 34.5	N.A.	N.A.
Accomack	.7	.8	.3	.6	2.4		N.A.	32.5	N.A.	N.A.
Northampton	.5	1.1	.1	.1	1.8		N.A.	38.5	N.A.	N.A.

N.A. signifies not available.

^{1/} This may be considered to be primarily cropland since there is relatively little pastureland on this part of the peninsula.

Source: Calculated from data presented in Table 21.

Continued

Table 22--Land use as a percent of total land area, Delmarva Peninsula, 1976

Area	Agricultural		Non urban, non-agricultural					Final Total
	Other Agriculture	Misc. Agriculture	Total Agriculture	Woodland	Inland Water	Wetland	Trans/ Barren	
						Percent		
DELMARVA PENINSULA	.3		42.7	36.7	.5	15.9	.7	100.0
Delaware:	.7		50.3	36.1	.7	7.7	.4	100.0
Kent	.8		53.8	29.1	.7	11.1	.1	100.0
New Castle	1.4		59.3	25.0	.7	12.2	.3	100.0
Sussex	.5		46.3	42.8	.6	4.7	.5	100.0
Maryland:	.1		43.2	41.6	.5	10.9	.1	100.0
Upper Shore--	.1		59.2	34.6	.4	2.0	.0	100.0
Caroline	.0		55.9	41.1	.1	.8	.0	100.0
Cecil	.0		57.9	35.1	.8	1.8	.0	100.0
Kent	.4		63.8	29.0	.5	3.4	.0	100.0
Queen Anne's	.0		60.1	33.5	.3	2.1	.0	100.0
Talbot	.0		57.7	34.1	.4	1.9	.0	100.0
Lower Shore--	.0		30.6	47.2	.6	17.9	.2	100.0
Dorchester	.0		30.7	41.2	1.2	24.7	.0	100.0
Somerset	.0		24.9	42.5	.3	29.9	.0	100.0
Wicomico	.2		35.5	52.3	.3	6.7	.0	100.0
Worcester	.1		30.6	53.4	.3	10.3	.9	100.0
Virginia:	.0		34.5	32.4	.2	29.2	1.5	100.0
Accomack	.0		32.5	35.2	.2	28.2	1.4	100.0
Northampton	.0		38.5	26.6	.2	31.3	1.7	100.0

Source: Calculated from data presented in Table 21.

concentration of Residential land use with 9,723 acres. Other significant concentrations of Residential land acreage are found in Worcester County, Wicomico County, and Talbot County, Maryland.

The average amount of land in Commercial use on the Delmarva Peninsula is relatively small - one half of one percent. However, among the 14 counties the percentage of Commercial land use ranges from .1 to 1.1 percent. Within the region two of the most active centers of commerce are Dover, Delaware, and Salisbury, Maryland. Dover serves as a major center for wholesale and retail trade in the northern portion of the Peninsula. Salisbury - regional center for wholesaling, retailing, transportation, and services - performs the same function for the southern Peninsula. While commercial activity is generally located in areas with high population concentrations, there are some interesting exceptions. In Virginia the percentage of land devoted to Commercial activities is greater than that of Residential use in both Northampton (1.1%) and Accomack (.8%) counties. This may be attributable, in part, to the expansion of commercial enterprises to accommodate non-residents--such as tourists, hunters, and truckers--who may account for a significant portion of trade in an area in which the resident population base is relatively low. In addition, land uses connected with water related activities such as docks, marina complexes, and seafood processing facilities were categorized as Commercial in an area in which coastal areas, inlets, and harbors abound.

Within the 14 counties on the Delmarva Peninsula the amount of land used for Industrial purposes ranges from approximately 50 to 5,680 acres. As a general rule, industrialization is greatest in those counties with the largest amounts of Residential and Commercial activity. Such areas of

large population concentrations usually possess the diverse transportation network necessary for efficient access to markets; skilled labor, and supporting suppliers of equipment and industrial services. However, relatively large acreages of industrial use also appear in some Peninsula counties where forests and farms supply sources of raw material - such as timber, broilers, and vegetables - for processing.

Approximately 26,300 acres of land on the Delmarva Peninsula are devoted to Urban Open uses--11,495 acres in Delaware, 12,847 acres in Maryland, and 1,953 acres in Virginia. While Kent County, Delaware, has the largest amount of acreage (5,732 acres), Cecil County, Maryland, has the greatest proportion (1.7%) of land in Urban Open use. Northampton County, Virginia, has the least amount--both in terms of acreage and proportion--of Urban Open land on the Peninsula.

Of the three general classifications, Agricultural activity occurs on over four of every ten acres of land on the Delmarva Peninsula. Although rather evenly distributed, the northern counties have a considerably larger portion of total land area devoted to agriculture than the counties in the southern half of the Peninsula. In the Upper Shore area of Maryland, for example, Agricultural land use is 59.2 percent of the total land area while in the Lower Shore area only 30.6 percent of total land area is agricultural. In part, this is a reflection of the larger proportion of total land suitable for agriculture in the Upper Shore area since wetlands account for over a sixth of the land area (17.9%) in the Lower Shore area as compared to only 2.0 percent in the Upper Shore. In every county, however, Agricultural land use is more than 24 percent of total land area.

Within the Agricultural classification, Cropland is the largest land use - with 29.4 percent of the Peninsula total. Three counties in the Upper Shore area contain the greatest percentage of Cropland: Kent (62.4%), Queen Anne's (59.4%), and Talbot (56.8%). In every county in Delaware and Maryland, Cropland comprises more than one-fifth (22%) of land use.

In Delaware and Maryland, land uses which could neither be clearly identified as either Cropland or Pasture or which served both purposes were placed in a special Cropland/Pasture category. Due to a definitional difference, all acreage, whether Cropland or Pasture, was categorized as Cropland/Pasture in Virginia. However, the actual ratio of Cropland to Pasture in Virginia is probably very similar to that of the southern counties of Maryland.

Pasture accounted for .9 percent of land usage. Acreage devoted to pasture was relatively greater in Delaware and the Upper Shore of Maryland than in the rest of the Peninsula. Cecil County, Maryland, with 3.9 percent had the highest proportion of land in pasture. Separate Pasture land area was not estimated for Virginia but can safely be considered as a relatively small proportion.

As Table 22 illustrates, the second smallest category within the Agricultural classification is Confined Feeding. A significant portion of land in the Confined Feeding category is used for poultry production. The largest percentage of Confined Feeding occurs in the Lower Shore area of Maryland, where the broiler industry is very heavily concentrated. The counties of Wicomico, Worcester, and Somerset, Maryland, account for the greatest acreages of Confined Feeding. In Delaware, the percentage of land devoted to Confined Feeding is relatively low while in Virginia the proportion, because of the lack of a separate classification, cannot be

reliably estimated.

All land neither Urban nor Agricultural is included in the Non-Urban, Non-Agricultural classification. Two of the larger categories, Woodland and Wetland, might well be considered as separate classifications under another grouping system. Over 1.3 million acres can be categorized as Woodland on the Delmarva Peninsula. Only Total Agriculture with approximately 1.5 million acres is a larger land use than Woodland. The amount of acreage contained in the Wetland category is three times as great as that in the Total Urban classification. In comparison to Total Agriculture, however, Wetland land use accounts for only one-third as much area. The two other categories within the Non-Urban, Non-Agricultural classification, Inland Water and Beach/Transitional/Barren, are relatively minor uses which combined account for less than 1.5 percent of total Peninsula land acreage.

In comparison to the other two general classifications, acreage devoted to Non-Urban, Non-Agricultural purposes is 15.37 times as great as Urban and 1.26 times as great as Agricultural land use. The Non-Urban, Non-Agricultural classification accounts for over half (53.8%) of total Peninsula usage. The largest concentration of Non-Urban, Non-Agricultural land occurs in the Lower Shore area of Maryland and in Virginia. The amount of Non-Urban, Non-Agricultural land ranges from 32.9 percent in Kent County, Maryland, to 72.8 percent in Somerset County, Maryland.

Woodland is the largest category within the Non-Urban, Non-Agricultural classification and accounts for over one-third (36.7%) of Peninsula land area. Like Agricultural land, Woodland is relatively evenly distributed on the Peninsula with each county having at least one quarter of total land area in Woodland uses. In contrast to the distribution of Agricultural

land, however, the counties in the southern half of the Peninsula have a larger percentage of Woodland than those in the northern part. Woodland in the Lower Shore counties of Worcester and Wicomico, Maryland, accounts for 53.4 percent and 52.3 percent of land area, respectively. Commercial forestry on the Delmarva Peninsula is most heavily concentrated in the Lower Shore of Maryland where the greatest amount of forest and woodland is located.

Wetland, the second largest category within the Non-Urban, Non-Agricultural classification, accounts for 15.9 percent of Peninsula land area. In terms of distribution, the lower half of the Peninsula has considerably larger acreages of Wetland than the northern sector. While relatively sparse in the Upper Shore area of Maryland, Wetland accounts for over one-fifth of total land acreage in several counties on the Lower Shore of Maryland and Virginia. In Northampton County, Virginia, Somerset County, Maryland, and Accomack County, Virginia, Wetland ranges between 28 and 31 percent of total land area.

Table 23 presents the county land use data as a percent of the Delmarva total and further illustrates the distribution of land use among counties. Data in Table 23 substantiates the fact that land use below the Chesapeake and Delaware Canal is overwhelmingly rural in nature with small urban areas accounting for the residential, commercial, and industrial activity.

Table 23--Land and water areas and land use as a percent of survey area totals, Delmarva Peninsula, 1970.

Area	Urban				Total Urban	Agricultural			Confining
	Residential	Commercial	Industrial	Urban Open		Cropland	Cropland/ Pasture	Pasture	
-----Percent-----									
DELMARVA PENINSULA	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Delaware:	37.0	23.1	57.4	43.9	39.3	38.8	.3	72.9	14.0
Kent	12.4	9.7	19.4	21.9	14.8	14.6	.0	19.2	.7
New Castle	2.1	1.6	3.5	1.8	2.2	4.8	.0	14.9	.2
Sussex	22.5	11.8	34.5	20.2	22.3	19.4	.3	38.8	13.1
Maryland:	59.5	50.7	35.7	48.7	53.6	61.2	5.7	27.1	86.0
Upper Shore--	27.9	18.6	15.8	24.0	24.6	37.2,	4.9	24.3	16.8
Caroline	3.4	6.3	.3	2.9	3.2	7.6	4.5	7.3	10.2
Cecil	2.3	.5	.8	4.7	2.4	2.9	.1	8.7	.0
Kent	5.3	3.3	3.1	3.1	4.4	8.4	.0	4.4	.0
Queen Anne's	8.1	2.3	6.2	7.7	7.2	10.7	.2	2.1	3.4
Talbot	8.8	6.2	5.4	5.6	7.4	7.4	.1	1.8	3.2
Lower Shore--	31.6	32.1	19.9	24.7	28.9	24.0	.8	2.8	69.2
Dorchester	6.6	5.0	5.9	4.0	5.9	8.1	.1	.4	5.3
Somerset	4.3	3.3	1.2	3.4	3.7	3.6	.2	.5	16.0
Wicomico	10.0	12.5	7.7	6.8	9.3	5.9	.2	.6	24.0
Worcester	10.7	11.3	5.1	10.5	10.0	6.4	.3	1.3	23.9
Virginia:	3.5	26.2	6.9	7.4	7.1	N.A.	94.0	N.A.	N.A.
Accomack	2.7	15.4	6.1	6.8	5.2	N.A.	59.4	N.A.	N.A.
Northampton	.8	10.8	.8	.6	1.9	N.A.	34.6	N.A.	N.A.

N.A. signifies Not Available.

Source: Calculated from data presented in Table 21.

Continued

Table 23--Land and water areas and land use as a percent of survey area totals, Delmarva Peninsula, 1970.

Area	Agricultural		Non urban, non-agricultural				Beach/ Trans/ Barren	Total Non-Ur- ban,Non-Agric.	Final Total
	Other Misc. Agriculture	Total Agriculture	Woodland	Inland Water	Wetland				
DELMARVA PENINSULA	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Delaware:	83.3	35.3	29.1	40.5	19.7	29.8	27.0	31.1	
Kent	31.9	13.0	8.1	14.0	9.7	2.8	8.5	10.7	
New Castle	18.4	4.5	2.2	5.0	3.4	2.6	2.5	3.4	
Sussex	33.0	17.8	18.8	21.5	6.6	24.4	16.0	17.0	
Maryland:	15.6	54.9	60.4	55.2	50.2	20.2	57.7	56.3	
Upper Shore--	9.8	33.1	22.0	18.1	4.0	.0	17.6	24.8	
Caroline	.5	7.3	6.1	1.7	.4	.0	4.7	5.8	
Cecil	.0	2.7	1.9	3.3	.3	.0	1.5	2.1	
Kent	8.2	7.3	3.8	5.0	1.4	.0	3.2	5.1	
Queen Anne's	.8	9.3	5.9	4.1	1.1	.0	4.7	6.9	
Talbot	.3	6.5	4.3	4.0	.8	.0	3.5	4.9	
Lower Shore--	5.8	21.8	38.4	37.1	46.2	20.2	40.1	31.5	
Dorchester	.0	7.0	10.7	23.6	20.4	.0	13.1	10.1	
Somerset	.6	3.4	6.6	4.2	14.8	.0	8.5	6.0	
Wicomico	4.4	5.5	9.2	3.6	3.8	.2	7.8	6.8	
Worcester	.8	5.9	11.9	5.7	7.2	20.0	10.7	8.6	
Virginia:	1.1	9.8	10.5	4.3	30.1	50.0	15.3	12.6	
Accomack	1.1	6.2	7.7	3.0	19.5	31.5	10.5	8.4	
Northampton	.0	3.6	2.8	1.3	10.6	18.5	4.8	4.2	

Source: Calculated from data presented in Table 21.

WATER USE

Water is a major resource in both manufacturing and agriculture. The "use" of water in the two sectors, however, has different implications for water supply and water quality. Most manufacturing water use is for cleaning and cooling with very little of the water intake being embodied in the product or lost to the atmosphere as evaporation or transpiration. Thus, the supply of water to other users is substantially unchanged by its use in manufacturing. Water quality, on the other hand, is often adversely affected by the waste heat, organic materials, heavy metals, and nutrients in manufacturing waste water. Agricultural water use is consumptive to the extent that it is used for irrigation; livestock and poultry consumption; and domestic purposes. Compared to manufacturing use of water, agricultural use may have a greater impact on water supply particularly when large acreages are irrigated. Agricultural use also has impacts on water quality. Poor farming techniques can result in runoff with high sediment loads and in the discharge of fertilizer nutrients and pesticides into waterways. Runoff from feedlots may also contribute high concentrations of animal waste. The goal in water resources management for both uses, however, is the same - to maximize productive use of available supplies and to minimize pollution of all types.

Manufacturing

The major water-using industries on the Peninsula are those engaged in the manufacture of food and kindred products; textile mill products; lumber and wood products; chemicals; rubber products; stone, clay, glass and concrete products; primary metals; and machinery except electrical machinery. In 1973 there were 149 establishments on the Delmarva Peninsula in these industry

groups. Of the total, 104 (70%) were in the food and kindred products group. Table 24 lists the number of establishments by industry group and by county.

Caroline, Dorchester, Talbot, and Wicomico Counties in Maryland and Sussex County, Delaware, each had ten or more establishments engaged in manufacturing and processing food and kindred products. These counties also accounted for a major proportion of the vegetables grown on the Peninsula, broilers raised, and seafood landed. Among the other industry groups, only chemicals and allied products and stone, clay, glass, and concrete products had three or more establishments in any one county. Eight plants in the chemical group were located in Sussex County, Delaware. The counties of Kent and Sussex in Delaware and Wicomico in Maryland each had three establishments engaged in stone, clay, glass, or concrete product manufacturing.

Agriculture

Agricultural water use for the Chesapeake Bay Study Area, which includes the Delmarva Peninsula, was estimated for the years 1950, 1960, and 1970.^{1/} This section summarizes the procedure used to develop those estimates and presents the estimates of the three components of rural water use - rural domestic; livestock and poultry; and irrigation - for the 14 counties on the Peninsula.

Rural Domestic Water Use. Between 1950 and 1970 the domestic population was a major user of water in rural areas. By 1970 Census of Population definition, the rural domestic population is composed of a rural farm component and a rural nonfarm component. All rural residents living on farms were classified as rural farm, while the remaining rural population was categorized as rural nonfarm.

^{1/} John Green, Rural Water Uses, 1950-1960-1970, Chesapeake Bay Study Area, NRED, ERS, USDA, Upper Darby, PA, April 1973.

Table 24--Number of establishments in major water-using industries, Delmarva Peninsula, 1973^{1/}

Industry	Delaware		Total	Maryland			Upper Shore- Maryland	Maryland Dorchester
	Kent	Sussex		Caroline	Kent	Queen Anne		
Food and Kindred Products	4	10	14	13	6	4	33	23
Textile Mill Products	1	1	2	-	-	-	1	-
Lumber and Wood Products	-	-	-	-	1	1	2	1
Chemicals and Allied Products	3	8	11	-	1	-	2	1
Rubber Products	-	3	3	1	-	-	3	-
Stone, Clay, Glass and Concrete Products	1	1	2	2	1	1	6	-
Primary Metal Industries	-	-	-	-	-	-	-	1
Machinery except Electrical	-	1	1	-	1	-	2	-
Totals	9	24	33	16	10	6	47	26
Percent	6%	16%	22%	11%	7%	4%	32%	17%

Continued

^{1/} Exclusive of New Castle County, Delaware, and Cecil County, Maryland.

Table 24--Number of establishments in major water-using industries, Delmarva Peninsula, 1973 (Continued)

	Maryland			Lower Shore-		Total	Virginia			Total	Delmarva Peninsula
	Somerset	Wicomico	Worcester	Maryland	Maryland		Accomack	Northampton	Virginia		
Food and Kindred Products	6	14	5	48	81		6	3	9		104
Textile Mill Products	1	--	-	1	2		-	-	-		4
Lumber and Wood Products	-	--	-	1	3		-	-	-		3
Chemicals and Allied Products	-	--	-	1	3		1	-	1		15
Rubber Products	-	--	-	-	3		-	-	-		6
Stone, Clay, Glass and Concrete Products	-	3	1	4	10		1	-	1		13
Primary Metal Industries	-	-	-	1	1		-	-	-		1
Machinery except Electrical	-	-	-	-	2		-	-	-		3
Totals	7	19	6	58	105		8	3	11		149
Percent	5%	13%	4%	39%	71%		5%	2%	7%		100%

Source: Chesapeake Bay - Existing Conditions Report, Appendix B, Department of the Army, Baltimore District Corps of Engineers, 1973.

In 1950 the rural population on the Peninsula was 332,299 and by 1970 had increased slightly more than 20 percent to 400,319 (Table 1). The rural nonfarm population comprised 70.4 percent of the rural population in 1950, 84.5 percent in 1960, and 92.2 percent in 1970. During this period the official rural nonfarm population count increased in the Northeast due to two major factors: (1) the increased development of rural areas, and (2) changed Census definitions that narrowed the "rural farm" classification.^{1/}

Given the rural farm and nonfarm populations, the proportion of the rural population served by running water in each county for 1950, 1960, and 1970 was obtained by computing the percentages of rural farm and nonfarm households served by running water as reported in 1950, 1960, and 1970 Censuses of Housing; multiplying rural farm and nonfarm populations by these percentages, adding the resulting two figures; and dividing by the total rural population. This method assumed that the average size rural farm and nonfarm household, with and without running water, were the same.

Annual water use rates for households with and without running water were obtained from published information of the United States Geological Survey (USGS). The total amount of water used by the rural population annually was then obtained by multiplying rural population numbers with and without running water by the appropriate annual use rates. Rural domestic water used by county for 1950, 1960, and 1970 is shown in Table 25. Total rural domestic water use on the Peninsula rose from 3,215.2 million gallons annually in 1950 to 6,377.0 million gallons annually in 1970, an increase of 98.3 percent. The differences among counties for each year reflected differences in rural population by county and the proportion of county residences with and without running water in the stated years.

^{1/} Chesapeake Bay, Existing Conditions Report, Appendix B - The Land - Resources and Use., p. BX-7, BX-10.

Table 25--Annual rural domestic water use, Delmarva Peninsula, 1950, 1960, and 1970.

Area	Million Gallons			Percent Change 1950-1970
	1950	1960	1970	
DELMARVA PENINSULA	3215.2	5283.8	6377.0	98.3
Delaware:	1353.8	2278.8	2846.3	110.2
Kent	277.3	790.0	1001.9	261.3
New Castle	558.7	660.0	697.5	24.8
Sussex	517.8	828.8	1146.9	121.5
Maryland:	1494.1	2503.1	3002.6	101.0
Upper Shore--	828.2	1441.9	1676.8	102.5
Caroline	166.6	251.4	303.3	82.1
Cecil	294.9	619.4	652.6	121.3
Kent	94.9	158.2	187.0	97.0
Queen Anne's	125.5	204.9	271.8	116.6
Talbot	146.3	208.0	262.1	79.2
Lower Shore--	665.9	1061.2	1325.8	99.1
Dorchester	129.1	189.4	247.3	91.6
Somerset	116.6	163.0	206.7	77.3
Wicomico	218.9	443.8	618.7	182.6
Worcester	201.3	265.0	253.1	25.7
Virginia	367.3	501.9	528.1	43.8
Accomack	224.3	331.3	359.1	60.1
Northampton	143.0	170.6	169.0	18.2

Source: Rural Water Uses, 1950-1960-1970, Chesapeake Bay Study Area, NRED-ERS-USDA, Upper Darby, Pa., April 1973.

Livestock and Poultry Water Use. Another component of agricultural water use is water used by livestock and poultry. Water is required to sustain these animals and to enable them to produce the livestock and poultry products marketed by Peninsula farmers.

At five year intervals the United States Department of Commerce conducts a Census of Agriculture to obtain data on the number of livestock and poultry raised and marketed during the previous year. In order to correspond as closely as possible to the Census of Population years used to determine rural domestic water use, the Censuses of Agriculture for the years 1959, 1969, and 1974 were used as data sources for livestock and poultry numbers. Inventory numbers from the Census of Agriculture were used as the measure of cattle and calves; milk cows; sheep and lambs; horses and ponies; and chickens three months and older. Since hogs and pigs; broilers; and turkeys have production cycles of less than one year, the inventory numbers did not accurately reflect the number of these species actually raised over the course of a year. Consequently, number sold alive was used as the measure of annual production of hogs and pigs; broilers; and turkeys.

Production trends for livestock and poultry for the period 1959-1974 are shown in Table 20 for the fifteen years between 1959 and 1974. Inventories of cattle and calves; milk cows; sheep and lambs; and horses and ponies all decreased substantially after 1959 while the inventory of chickens three months and older increased over 22 percent. Sales of hogs and pigs rose 56 percent over the fifteen-year period. Between 1959 and 1974, sales of broilers increased dramatically. In 1959, 155.6 million broilers were sold. By 1974, this number had risen to 286.3 million birds, an 84 percent increase.

Production and sale of turkeys, on the other hand, declined substantially over the same period.

Water use rates for each type of livestock or poultry were obtained from USGS and applied to the inventory or sales numbers as appropriate. The water use rates represented on-farm water use only. Water used in the processing of livestock and poultry products was not included.^{1/} Annual water use estimates for livestock and poultry by county for 1959, 1969, and 1974 are shown in Table 26. Total livestock and poultry water use rose from 1,863.9 million gallons in 1959 to 2,161.6 million gallons in 1974, an increase of 16.0 percent. Differences in livestock and poultry water use among the counties over the three census years are a reflection of changes both in the numbers of livestock and poultry raised in each county and in the water use coefficients for each species. In general, those counties with relatively large populations of chickens and broilers in 1974 (see Table 20) showed the largest increase in livestock and poultry water use over the period. Those counties with large proportions of cattle; milk cows; and sheep and lambs, on the other hand, generally experienced an absolute decrease in water use during the same period. Table 27 further illustrates county trends in livestock and poultry water use by species for the period 1959-1974. For the Peninsula as a whole, only cattle and calves; hogs and pigs; chickens three months and older; and broilers used substantially more water in 1974 than in 1959. Water used by milk cows decreased substantially because of a drastic reduction in the number of milk cows (Table 20). This occurred despite an increase in per capita water use by milk cows between 1959 and 1974.

^{1/} Chesapeake Bay, Existing Conditions Report, Appendix B - The Land - Resources and Use., p. BX-20.

Table 26--Annual water use by livestock and poultry, Delmarva Peninsula, 1959, 1969, and 1974.

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Area	1959	1969	1974	Percent Change 1959-1974
		Million Gallons		
DELMARVA PENINSULA	1,863.9	2,201.1	2,161.6	16.0
Delaware	621.0	761.5	796.1	28.2
Kent	185.2	162.9	157.6	-14.9
New Castle	118.7	94.2	86.0	-27.6
Sussex	317.1	504.4	552.5	74.2
Maryland:	1,194.0	1,370.0	1,309.7	9.7
Upper Shore--	828.8	776.1	704.3	-15.0
Caroline	133.0	158.0	145.8	9.6
Cecil	202.1	184.9	187.4	-07.3
Kent	160.3	154.1	141.5	-11.7
Queen Anne's	212.3	172.0	145.7	-31.4
Talbot	121.1	107.1	83.9	-30.1
Lower Shore--	365.2	593.9	605.4	65.8
Dorchester	42.1	58.4	57.2	35.9
Somerset	77.5	127.6	123.1	58.9
Wicomico	111.1	224.1	229.3	106.4
Worcester	134.5	183.8	195.8	45.6
Virginia:	48.9	69.6	55.8	14.1
Accomack	35.7	54.6	49.2	37.8
Northampton	13.2	15.0	6.6	-50.0

1/ Percent change obtained by subtracting 1959 from 1974 figure and dividing the difference by the 1959 figure.

Source: Rural water Uses, 1950-1960-1970, Chesapeake Bay Study Area, NRED-ERS, USDA, Upper Darby, Pa., April 1973, and Bureau of Census, Census of Agriculture, 1959, 1969, and 1974

Table 27--Annual livestock and poultry water use by species, Delmarva Peninsula, 1959, 1969, and 1974.

Area	Cattle and Calves		Milk Cows		Hogs and Pigs		Sheep and Lambs					
	1959	1969	1974	1959	1969	1974	1959	1969	1974			
-- Million Gallons--												
DELMARVA PENINSULA	367.9	441.4	447.4	754.6	512.2	463.7	207.7	353.7	325.7	13.3	7.7	4.1
Delaware	99.9	120.0	134.1	214.4	152.8	136.8	63.2	118.7	120.3	3.2	1.5	1.1
Kent	44.6	53.5	55.2	98.1	71.3	64.6	23.5	22.4	17.4	1.1	0.7	0.6
New Castle	30.6	36.8	34.8	74.0	45.5	42.9	7.4	5.3	3.9	1.1	0.5	0.3
Sussex	24.7	29.7	44.1	42.3	36.0	29.3	32.3	91.0	99.1	1.0	0.3	0.1
Maryland:	256.4	307.6	304.1	534.1	355.1	324.7	133.5	215.1	186.4	8.2	5.6	2.7
Upper Shore--	216.8	260.1	247.9	467.5	321.2	296.0	85.1	93.2	68.7	5.7	4.7	2.0
Caroline	26.3	31.5	32.9	60.2	44.4	33.7	13.1	15.1	15.4	0.1	0.1	0.3
Cecil	63.7	76.5	83.2	126.9	96.8	97.1	6.9	4.3	2.4	0.8	1.6	0.5
Kent	45.3	54.3	55.4	100.5	78.6	73.5	11.8	18.2	10.8	1.5	1.5	0.4
Queen Anne's	48.5	58.2	52.5	125.4	74.8	66.7	32.7	32.0	21.5	1.7	0.9	0.5
Talbot	33.0	39.6	23.9	54.5	26.6	25.0	20.6	23.6	18.6	1.6	0.6	0.3
Lower Shore--	39.6	47.5	56.2	66.6	33.9	28.7	48.4	121.9	117.7	2.5	0.9	0.7
Dorchester	9.9	11.9	11.3	19.1	12.4	6.9	6.0	16.6	19.9	0.6	0.3	0.2
Somerset	10.5	12.6	16.0	12.9	10.1	11.5	9.9	14.7	11.9	0.4	0.3	0.3
Wicomico	4.5	5.4	11.7	7.9	2.8	1.9	13.1	51.3	44.5	0.4	0.1	0.1
Worcester	14.7	17.6	17.2	26.7	8.6	8.4	19.4	39.3	41.4	1.1	0.2	0.1
Virginia:	11.6	13.8	9.2	6.1	4.3	2.2	11.0	19.9	19.0	1.9	0.6	0.3
Accomack	6.8	8.1	5.3	4.4	2.1	2.1	6.8	13.4	16.7	0.9	0.3	0.2
Northampton	4.8	5.7	3.9	1.7	2.2	0.1	4.2	6.5	2.3	1.0	0.3	0.1

Continued

Table 27--Annual livestock and poultry water use by species, Delmarva Peninsula, 1959, 1969, and 1974 (Continued)

Area	Chickens						Broilers						Turkeys		
	Horses and mules			3 months and over			1959			1969			1974		
	1959	1969	1974	1959	1969	1974	1959	1969	1974	1959	1969	1974	1959	1969	1974
-----Million Gallons-----															
DELMARVA PENINSULA	27.4	22.9	18.6	20.7	40.3	37.2	466.8	816.9	858.9	5.5	6.0	5.9			
Delaware:	11.3	9.8	8.9	10.9	14.9	15.5	213.6	338.7	373.5	4.5	5.1	5.9			
Kent	4.6	4.5	3.8	1.9	1.5	2.5	10.2	9.0	13.5	1.2	*	*			
New Castle	2.3	2.1	2.0	1.7	2.3	1.9	1.2	1.2	-	0.4	0.5	0.2			
Sussex	4.4	3.2	3.1	7.3	11.1	11.1	202.2	328.5	360.0	2.9	4.6	5.7			
Maryland:	13.2	12.4	9.3	8.8	20.9	21.1	238.8	452.4	461.4	1.0	0.9	*			
Upper Shore--	7.3	8.7	6.5	5.0	4.5	3.1	41.1	83.7	80.1	0.3	*	*			
Caroline	1.6	0.7	0.7	1.3	2.6	1.9	30.3	63.6	60.9	0.1	-	*			
Cecil	2.1	4.0	3.1	1.7	1.1	0.8	*	0.6	0.3	*	*	*			
Kent	0.8	1.1	1.0	0.4	0.1	0.1	-	0.3	0.3	*	*	*			
Queen Anne's	1.9	2.3	1.0	0.9	0.5	0.2	1.2	3.3	3.3	*	*	-			
Talbot	0.9	0.6	0.7	0.7	0.2	0.1	9.6	15.9	15.3	0.2	*	*			
Lower Shore--	5.9	3.7	2.8	3.8	16.4	18.0	197.7	368.7	381.3	0.7	0.9	*			
Dorchester	1.0	0.8	0.5	0.9	1.1	1.0	4.5	15.3	17.4	0.1	*	-			
Somerset	0.5	0.4	0.4	1.0	4.9	3.5	42.3	84.6	79.5	*	*	-			
Wicomico	2.0	1.6	0.7	0.7	6.6	8.4	81.9	155.4	162.0	0.6	0.9	*			
Worcester	2.4	0.9	1.2	1.2	3.8	5.1	69.0	113.4	122.4	*	*	*			
Virginia:	2.9	0.7	0.4	1.0	4.5	0.7	14.4	25.8	24.0	*	-	-			
Accomack	1.8	0.4	0.2	0.9	4.5	0.7	14.1	25.8	24.0	*	-	-			
Northampton	1.1	0.3	0.2	0.1	*	*	0.3	-	-	*	-	-			

* Less than 50,000 gallons

Source: Rural Water Uses 1950-1960-1970, Chesapeake Bay Study Area, NRCD-ERS-USDA, Upper Darby, Pa., April 1973, and Bureau of Census, Census of Agriculture, 1959, 1969, and 1974.

Higher milk production rates per cow and greater use of water for sanitary purposes on dairy farms were primary factors responsible for increased per capita water consumption by milk cows during this period.

The percentage of total livestock and poultry water use accounted for by the consumption of each species in 1959, 1969, and 1974 is shown in Table 28 for the Peninsula as a whole and for each of the subareas. In 1959, consumption by cattle and calves and milk cows accounted for more than 60 percent of livestock and poultry water use, but in 1974 accounted for only slightly more than 40 percent. Broilers, on the other hand, used about 25 percent of the water in 1959, but nearly 40 percent in 1974. Trends within all Peninsula subareas showed similar shifts in water use among animal types.

Irrigation. On the Delmarva Peninsula, irrigation is commonly used only for vegetables, potatoes, and nursery crops. As in other humid areas of the United States, irrigation of field crops such as corn and soybeans and of pasture and hay crops is generally practiced by only a few farmers. In terms of water use, however, irrigation of only a small proportion of harvested cropland can require large volumes of water. One inch of water applied to one acre (an "acre-inch") is equivalent to 27,200 gallons - which would sustain a herd of 25 milk cows for a month at the rate of 35 gallons a day. Moreover, irrigation is a consumptive use of water. Depending upon the efficiency of application, from 65 to 90 percent of the water applied will be "used" as evaporation or transpiration.

Estimates of irrigation water use on the Peninsula are based on irrigation data from the Censuses of Agriculture for 1969 and 1974. Data on the number of Peninsula farms using irrigation, acreage irrigated, and water used are presented in Table 29. Comparison of Table 29 with Tables 25 and 26

Table 28--Annual water use by species as a percent of total livestock and poultry water use, Delmarva Peninsula and subareas, 1959, 1969, and 1974.

Area	Cattle and Calves			Milk Cows			Hogs and Pigs			Sheep and Lambs		
	1959	1969	1974	1959	1969	1974	1959	1969	1974	1959	1969	1974
	Percent											
DELMARVA PENINSULA	19.7	20.1	20.7	40.5	23.3	21.4	11.2	16.1	15.1	0.7	0.3	0.2
Delaware:	16.1	15.7	16.8	34.5	20.1	17.2	10.2	15.6	15.1	0.5	0.2	0.1
Maryland	21.5	22.5	23.2	44.7	25.9	24.8	11.2	15.7	14.3	0.7	0.4	0.2
Upper Shore	26.1	33.5	35.2	56.4	41.4	42.0	10.3	12.0	9.8	0.7	0.6	0.3
Lower Shore	10.9	8.0	9.3	18.3	5.7	4.7	13.3	20.5	19.4	0.7	0.1	0.1
Virginia	23.7	19.8	16.5	12.5	6.2	4.0	22.5	28.6	34.0	3.9	0.9	0.5

Area	Chickens											
	Horses and Mules			3 months and over			Broilers			Turkeys		
	1959	1969	1974	1959	1969	1974	1959	1969	1974	1959	1969	1974
	-	-	-	-	-	-	Percent			-	-	-
DELMARVA PENINSULA	1.5	1.0	0.9	1.1	1.8	1.7	25.0	37.1	39.7	0.3	0.3	0.3
Delaware	1.8	1.3	1.1	1.8	1.9	2.0	34.4	44.5	46.9	0.7	0.7	0.8
Maryland	1.1	0.9	0.7	0.7	1.5	1.6	20.0	33.0	35.2	0.1	0.1	*
Upper Shore	0.9	1.1	0.9	0.6	0.6	0.4	5.0	10.8	11.4	*	*	*
Lower Shore	1.6	0.6	0.5	1.1	2.8	3.0	54.1	62.1	63.0	*	0.2	*
Virginia	5.9	1.0	0.7	2.1	6.5	1.3	29.4	37.0	43.0	*	--	--

* Less than 0.05%

Source: Calculated from data presented in Table 27.

Table 29--Irrigated acreage and water use, Delmarva Peninsula, 1969 and 1974

Area	Class 1-5 Farms - 1969				Farms with Sales of \$2,500 and Over - 1974 ^{1/}				Proportion of Farms		Water Used		Inches per Acre	
	Farms		Acres		Acres		Feet Used		1969		1974		1969	
	Acre		Feet Used		Feet Used		Acre		1969		1974		1969	
DELMARVA PENINSULA	434.	48,365.	19,381.		389.	43,448.	18,748.		6.5	5.4	6,325.6	6,119.0	4.8	5.2
Delaware:	154.	20,385.	7,452.		142.	19,797.	7,866.		6.7	5.4	2,432.3	2,567.3	4.4	4.8
Kent	66.	10,902.	3,328.		70.	12,143.	4,478.		8.9	8.6	1,084.6	1,461.5	3.7	4.4
New Castle	30.	2,942.	881.		16.	730.	189.		8.0	4.5	289.8	61.7	3.6	3.1
Sussex	58.	6,541	3,243.		56.	6,924.	3,199.		3.4	3.1	1,057.9	1,044.1	5.9	5.5
Maryland:	192.	16,034.	7,004.		176.	16,241.	7,158.		3.9	3.7	2,286.0	2,336.3	5.2	5.3
Upper Shore--	82.	9,836.	4,800.		85.	11,372.	4,635.		3.3	3.3	1,565.8	1,512.8	5.9	4.9
Caroline	41.	5,150.	2,336.		55.	7,553.	3,179.		6.5	8.6	762.6	1,037.5	5.4	5.1
Cecil	6.	270.	106.		5.	199.	189.		1.6	1.4	34.5	61.7	6.1	11.4
Kent	11.	1,646.	1,120.		6.	1,505.	372.		2.7	1.8	365.0	121.4	8.2	3.0
Queen Anne's	18.	2,518.	1,083.		14.	1,946.	821.		4.0	3.1	352.9	268.0	5.2	5.1
Talbot	6.	312.	155.		5.	169.	74.		1.9	1.5	50.8	24.2	6.0	5.3
Lower Shore--	110.	6,198.	2,204.		91.	4,869.	2,523.		4.6	4.1	720.2	823.5	4.3	6.2
Dorchester	30.	1,858.	538.		32.	2,782.	1,245.		7.1	7.8	175.3	406.3	3.5	5.4
Somerset	13.	680.	328.		10.	341.	215.		3.3	2.5	106.9	70.2	5.8	7.6
Wicomico	63.	3,364.	1,271.		47.	1,594.	1,030.		7.6	5.9	416.2	336.2	4.5	7.8
Worcester	4.	296.	67.		2.	152.	33.		.6	.3	21.8	10.8	2.7	2.6
Virginia:	88.	11,946.	4,925.		71.	7,410.	3,724.		17.7	13.1	1,607.3	1,215.4	4.9	6.0
Accomack	45.	6,422.	2,646.		36.	4,087.	2,059.		12.1	9.7	864.6	672.0	4.9	6.0
Northampton	43.	5,524.	2,279.		35.	3,323.	1,665.		23.2	16.4	742.7	543.4	5.0	6.0

Source: Bureau of Census, Census of Agriculture, 1969 and 1974.

^{1/} Class 1-5 Farms (1969 categorization) and Farms with Sales of \$2,500 and Over (1974 classification) can be considered as fairly comparable.

Table 30--Acreage of irrigated crops, Delmarva Peninsula, 1974

Area	Cropland Pasture	Corn	Soybeans	Wheat	Barley	Hay	Acres-----			Nursery & Other	Total
							Irish Potatoes	Vege- tables	Orchard Berries		
DELMARVA PENINSULA	116	3,323	3,816	639	508	161	7,232	25,489	428	2,095	43,807
Delaware:	47	1,418	2,055	374	90	17	3,573	12,212	293	238	20,317
Kent	17	305	918	206	-	7	3,264	7,258	58	188	12,221
New Castle	15	1	-	-	-	-	305	308	19	10	658
Sussex	15	1,112	1,137	168	90	10	4	4,646	216	40	7,438
Maryland:	69	1,758	1,685	250	418	144	4	9,798	100	1,557	15,783
Upper Shore--	54	1,493	1,101	140	243	53	1	6,626	43	1,103	10,857
Caroline	4	915	1,021	140	237	3	1	5,107	36	303	7,767
Cecil	-	-	20	-	-	-	N.A.	N.A.	-	23	43
Kent	-	150	-	-	-	50	-	N.A.	-	675	875
Queen Anne's	50	388	50	-	-	-	-	1,474	7	50	2,019
Talbot	-	40	10	-	6	-	-	45	N.A.	52	153
Lower Shore--	15	265	584	110	175	91	3	3,172	57	454	4,926
Dorchester	-	45	521	70	175	82	2	1,878	27	100	2,900
Somerset	-	70	35	-	-	-	-	115	15	42	277
Wicomico	13	-	28	40	-	9	1	1,179	15	312	1,597
Worcester	2	150	-	-	-	-	-	-	-	-	152
Virginia:	-	147	76	15	-	-	3,655	3,479	35	300	7,707
Accomack	-	22	16	-	-	-	1,510	2,656	-	168	4,372
Northampton	-	125	60	15	-	-	2,145	823	35	132	3,335

Source: Bureau of Census, 1974 Census of Agriculture.

N.A. signifies Not Available.

indicates that irrigated water use in 1974 was 96 percent of rural domestic water use in 1970 and consumed 2.8 times the water use of livestock and poultry in 1974. Table 30 indicates data on irrigated acreage by crop for 1974. Of the 43,448 acres irrigated in 1974, 25,489, or 59 percent, were in vegetables; an additional 7,232 acres, or 17 percent, in Irish potatoes; and 7,139 acres, or 17 percent, in corn and soybeans.

Total agricultural water use in 1969-70 was 14,903.7 million gallons. Of this total, 42.8 percent was rural domestic water use; 14.8 percent was used by livestock and poultry; and 42.4 percent was irrigation use. Rural domestic water use nearly doubled between 1950 and 1970 and livestock and poultry water use also increased 16.0 percent between 1950 and 1969. Future agricultural water use will depend on changes in all of the components of use: rural population growth, per capita use rates, and homes served by running water; livestock and poultry production and per capita use rates; and cropping patterns, climatic conditions, and production technology. Analysis of existing trends, however, would indicate that the rate of increase in agricultural water use in the future will probably decline, but no absolute decrease in water use can be expected unless there are dramatic shifts in the Delmarva agricultural economy.

SUMMARY

Despite its proximity to the eastern megalopolis, the Delmarva Peninsula is still essentially rural. Typical of most rural areas, the Peninsula's population growth has exceeded the growth of employment opportunities. As a result, workers (particularly young adults) have left the Peninsula to seek employment in adjacent metropolitan areas. The remaining population thus has a greater concentration (than the United States as a whole) of those least able by age and education to migrate. Atypical of most rural areas, however, the Peninsula has unique recreational assets and cultural features. As access to the Peninsula has been improved, development of these assets provided an economic stimulus that has had an impact throughout the Peninsula. Increasing land values and competition for available labor has resulted in the development of more intensive agricultural systems with a subsequent increase in farm income. Along with recreational development, this growth has been conducive to the development of the non-farm economy and resulted in an overall improvement in social well-being.

Further development of the Peninsula's land and water resources, however, will require careful planning to assure that the impacts of development do not detract from the Peninsula's environment (including its rural landscape) or induce changes in the region's economy that will result in the dislocation of Peninsula residents. Similarly, careful planning will be required to assure that development required

to sustain continued economic and social growth will be forthcoming. Given the resources of the Peninsula and their attraction for residents of the area, the states involved, and the nation at-large, the needs of all groups concerned must be recognized and considered in the planning process. Only a broad consensus of goals and means to achieve them will assure their attainment.

